



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

**Programme Handbook  
September 2022**

***Disclaimer:***

*The Programme Handbook Bachelor September 2022 Intake  
is meant for the students for Bachelor September 2022 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







### VISION

TO BE THE LEADING ENTREPRENEURIAL TECHNICAL UNIVERSITY



### MISSION

TO PRODUCE ENTERPRISING GLOBAL TECHNOPRENEURS

## Academic Activities Calendar for September 2022 Intake – Bachelor Only

DESCRIPTION	SEPTEMBER SEMESTER
Semester Registration for New Students	25 September 2022
Classes	3 Oct 2022 – 18 Nov 2022 28 Nov 2022 – 13 Jan 2023
Mid Sem Break	21 Nov – 27 Nov 2022
Revision	14 Jan 2023 – 18 Jan 2023
<b>FINAL EXAMINATION</b>	19 Jan 2023 – 4 Feb 2023

## 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 Raja Nazrul Hakim bin Raja Nazri            Deputy Dean Academic and Technology            Email: rajanazrul@unikl.edu.my            Phone: 06-551 2016</p>
	<p>Ms. Azu Farhana Binti Anuar            Deputy Dean Student Development &amp; Campus Lifestyle            Email: azufarhana@unikl.edu.my            Phone: 06-551 2136</p>
	<p>Ts Dr Muhammad Yusuf bin Hassan            Deputy Dean IIIP            Email: muhamadyusuf@unikl.edu.my            Phone: 06-551 2077</p>

# Academic Staff Member of UniKL MICET

## TECHNICAL FOUNDATION SECTION

SL: STUDY LEAVE  
SL: STUDY LEAVE

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



## PROCESS ENGINEERING TECHNOLOGY SECTION

**SL: STUDY LEAVE**

<b>NO.</b>	<b>NAME</b>	<b>HIGHEST QUALIFICATION</b>	<b>DESIGNATION</b>
1.	MOHD. RAZEALY BIN ANUAR (Dr.) (Head of Section)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
2.	AHMAD AZAHARI BIN HAMZAH (Dr)	PhD (ELECTRICAL ENGINEERING)	SENIOR LECTURER
3.	MS. AIZA SYUHANIZ BINTI SALLEH	MASTER OF ENGINEERING	LECTURER
4.	ALIFF RADZUAN BIN MOHAMAD RADZI (Ts. Dr)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
5.	AMIN SAFWAN BIN ALIKASTURI (Dr)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
6.	MR. AZRIN BIN ABDUL RAHMAN	MASTER OF SCIENCE (PROCESS PLANT MANAGEMENT)	SENIOR LECTURER
7.	MS. FARIDAH BINTI GHAFAR (SL)	MASTER OF SCIENCE	SENIOR LECTURER
8.	INDOK NURUL HASYIMAH BINTI MOHD AMIN (Assoc. Prof. Dr.)	PhD (CHEMICAL ENGINEERING & PROCESS)	ASSOCIATE PROFESSOR
9.	KELLY YONG TAU LEN (Assoc. Prof. Dr.)	PhD (MECHANICAL SCIENCE & ENGINEERING)	ASSOCIATE PROFESSOR
10.	LAW JENG YIH (Dr)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
11.	MS. MARMY ROSHAIDAH BINTI MOHD SALLEH	MASTER OF ENGINEERING	LECTURER
12.	MS. NADIA BINTI ISA (SL)	MASTER OF SCIENCE	SENIOR LECTURER
13.	MS. NAZERAH BINTI AHMAD	MASTER OF ENGINEERING	LECTURER
14.	NOR AINI BINTI BUROK (Ts.)	MASTER OF INDUSTRIAL SAFETY MANAGEMENT	SENIOR LECTURER
15.	NOR SHAHIRAH BINTI MOHD NASIR (Dr)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
16.	MS. NORULAKMAL BINTI NOR HADI	MASTER OF SCIENCE	SENIOR LECTURER
17.	MS. RABIATUL ADAWIAH BINTI MAT NOOR (SL)	MASTER OF SCIENCE	LECTURER
18.	MR. SYAHIDI FADZLI BIN ALFAN	MASTER OF SCIENCE (INDUSTRIAL & TECHNOLOGY MANAGEMENT)	LECTURER
19.	MR. SYED AZHAR BIN SYED AB RAHMAN	MASTER OF SCIENCE (CHEMICAL ENGINEERING)	SENIOR LECTURER
20.	WAN NOOR AIDAWATI BINTI WAN NADHARI (Dr.)	PhD (BIORESOURCE, PAPER AND COATINGS TECHNOLOGY)	SENIOR LECTURER
21.	ZAINAL ABIDIN BIN MOHD YUSOF (Ts.)	MASTER OF SCIENCE	SENIOR LECTURER

22.	ZULHAFIZ BIN TAJUDIN (Assoc. Prof. Ts. Dr.)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
23.	MS. ZURAIDAH BINTI RASEP (SL)	MASTER OF ENGINEERING	LECTURER

## **BIOENGINEERING TECHNOLOGY SECTION**

**SL: STUDY LEAVE**

<b>NO.</b>	<b>NAME</b>	<b>HIGHEST QUALIFICATION</b>	<b>DESIGNATION</b>
1.	MS. 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 (Ts.)	MASTER OF ENGINEERING	LECTURER
4.	MUHAMAD YUSUF BIN HASAN (Ts. Dr.)	MASTER OF SCIENCE (PROCESS PLANT MANAGEMENT)	SENIOR LECTURER
5.	MR. MUHAMMAD SHARIR BIN ABDUL RAHMAN	MASTER OF CHEMICAL ENGINEERING	LECTURER
6.	NIK IDA MARDIANA BINTI NIK PA (Dr.)	MASTER OF SCIENCE	SENIOR LECTURER
7.	MS. NORHANI BINTI JUSOH (SL)	MASTER OF ENGINEERING	SENIOR LECTURER
8.	MS. NURDIYANA BINTI HUSIN	MASTER OF SCIENCE	LECTURER
9.	NURUL FAEZAWATY BINTI JAMALUDIN (Ts.)	MASTER OF SCIENCE	SENIOR LECTURER
10.	ROZYANTI BINTI MOHAMAD (Ts. Dr)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
11.	RUZAINAH BINTI ALI @JAAFAR (Assoc. Prof. Dr.)	PhD (BIOTECHNOLOGY)	ASSOCIATE PROFESSOR
12.	TONG WOEI YENN (Dr.)	PhD IN MICROBIOLOGY	SENIOR LECTURER
13.	ZAINATUL 'ASYIQIN BINTI SAMSU (Ts. Dr)	MASTER OF SCIENCE	LECTURER

## **ENVIRONMENT AND POLYMER ENGINEERING TECHNOLOGY SECTION**

**SL: STUDY LEAVE**

<b>NO.</b>	<b>NAME</b>	<b>HIGHEST QUALIFICATION</b>	<b>DESIGNATION</b>
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.	MS. KHAIRUL NADIAH BINTI IBRAHIM	MASTER OF TECHNOLOGY	SENIOR LECTURER
6.	MR. MOHD SYAZWAN BIN MOHD GHAZALI (SL)	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.	MS. NORHAYATI BINTI MOHD IDRUS	MASTER OF SCIENCE	LECTURER
10.	ROBERT THOMAS BACHMANN (Prof. Dr.)	PhD (ENVIRONMENTAL ENGINEERING TECHNOLOGY)	PROFESSOR
11.	SITI NOORAIN BINTI ROSLAN (Dr)	DOCTOR OF ENGINEERING (CIVIL & ENVIRONMENTAL ENGINEERING)	SENIOR LECTURER
12.	MR. TENGKU FAZLI BIN TG JAYA @ TG YAHYA	MASTER OF ENGINEERING	SENIOR LECTURER
13.	AZANAM SHAH BIN HASHIM (Prof. Dato' Dr.)	DOCTOR OF ENGINEERING (MATERIAL SCIENCE)	PROFESSOR
14.	MR. FAHMI ASYADI BIN MD YUSOF (SL)	MASTER OF ENGINEERING	SENIOR LECTURER
15.	MS. MAZLINA BINTI GHAZALI (Ts.)	BACHELOR OF ENGINEERING (HONS) IN POLYMER ENGINEERING	ASST. LECTURER
16.	MR. MOHD EDYAZUAN BIN AZNI (SL)	MASTER OF ENG. TECH. (GREEN & ENERGY EFFICIENT BUILDINGS)	LECTURER
17.	MR. MUAZZIN BIN MUPIT (SL)	MASTER OF SCIENCE	SENIOR LECTURER
18.	MUZAFAR BIN ZULKIFLI (Ts. Dr.)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
19.	NOOR FAIZAH BINTI CHE HARUN (Dr)	DOCTOR OF ENGINEERING (ENVIRONMENTAL CHEMISTRY & ENGINEERING)	SENIOR LECTURER

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

## **FOOD ENGINEERING TECHNOLOGY SECTION**

**SL: STUDY LEAVE**

<b>NO.</b>	<b>NAME</b>	<b>HIGHEST QUALIFICATION</b>	<b>DESIGNATION</b>
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.	MS. FARAH SALINA BINTI HUSSIN	PhD (FOOD BIOTECHNOLOGY)	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.	MS. LILY SUHAILA BINTI YACOB	MASTER OF ENVIRONMENT (ENVIRONMENTAL SCIENCE)	LECTURER
7.	MS. MASNIZA BINTI MOHAMED @ MAHMOOD	PhD (KEJURUTERAAN KIMIA DAN PROSES)	SENIOR LECTURER
8.	NOR RAIHANA BINTI MOHAMED ZAM (Dr.)	PhD (NUTRITION)	SENIOR LECTURER
9.	NOR ZANARIAH BINTI SAFIEI (Dr.)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
10.	NORIZA BINTI AHMAD (Ts. Dr)	PhD (FOOD SCIENCE & TECHNOLOGY)	SENIOR LECTURER
11.	NORZAHIR SAPAWE (Assoc. Prof. Dr)	PhD (CHEMICAL ENGINEERING)	ASSOCIATE PROFESSOR
12.	NUR AQILAH BINTI HAMIM (Ts.) (SL)	BACHELOR OF PLANT BIOTECHNOLOGY	SPECIALIST
13.	MS. RINANI SHIMA BINTI ABD. RASHID (SL)	MASTER OF SCIENCE (FOOD TECHNOLOGY)	SENIOR LECTURER
14.	SHARIFAH SOPLAH BINTI SYED ABDULLAH (Ts Dr)	PhD (ENVIRONMENTAL ENGINEERING)	SENIOR LECTURER
15.	SHARIFAH MARIAM BINTI SAYED HITAM (Ts. Dr.)	PhD (BIOPROCESS ENGINEERING)	SENIOR LECTURER

## **CHEMICAL ENGINEERING SECTION**

**SL: STUDY LEAVE**

<b>NO.</b>	<b>NAME</b>	<b>HIGHEST QUALIFICATION</b>	<b>DESIGNATION</b>
1.	NOOR AINA BINTI MOHD NAZRI (Dr.) (Head of Section)	PhD IN ENGINEERING (GAS)	SENIOR LECTURER
2.	WONG CHEE SIEN (Dr.)	PhD (BIOPROCESS ENGINEERING)	SENIOR LECTURER
3.	CHIN LIP HAN (Dr.)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
4.	CHONG YUAN FOONG (IR.)	BACHELOR OF ENGINEERING (CHEMICAL)	SPECIALIST
5.	MS. FARRA WAHIDA BINTI SHAARANI	MASTER OF SCIENCE	SENIOR LECTURER
6.	MS. 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.	YUHANEES BINTI MOHAMED YUSOF (Dr.)	PhD (APPLIED SCIENCE)	SENIOR LECTURER
10.	SUZANA BINTI WAHIDIN (Assoc. Prof. Dr)	PhD (BIOPROCESSING ENGINEERING)	ASSOCIATE PROFESSOR

## **STUDENT DEVELOPMENT SECTION**

**SL: STUDY LEAVE**

<b>NO.</b>	<b>NAME</b>	<b>HIGHEST QUALIFICATION</b>	<b>DESIGNATION</b>
1.	MS. 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.	MS. INTAN NORJAHAN BINTI AZMAN	MASTER OF ARTS IN ENGLISH LANGUAGE	LECTURER
5.	MS. MARIATI BINTI MOHD SALLEH	MASTER OF EDUCATION	LECTURER
6.	MS. NOORHAYATI BINTI SAHARUDDIN	MASTER OF ARTS IN ENGLISH LANGUAGE	SENIOR LECTURER
7.	MS. ROSIAH BINTI OTHMAN	MASTER OF CORPORATE COMMUNICATION	LECTURER
8.	MS. SA'ADIAH BINTI HUSSIN	MASTER OF SCIENCE (CORPORATE COMMUNICATION)	SENIOR LECTURER

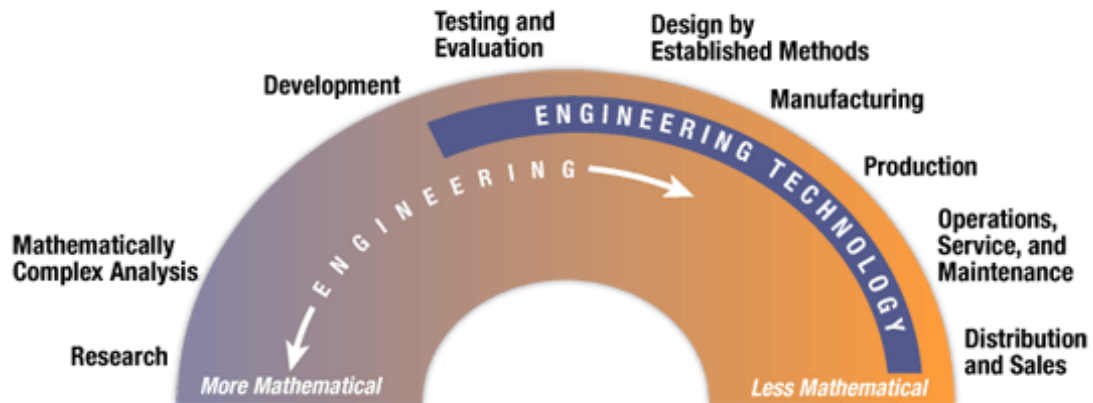
## **IIP SECTION**

**SL: STUDY LEAVE**

<b>NO.</b>	<b>NAME</b>	<b>HIGHEST QUALIFICATION</b>	<b>DESIGNATION</b>
1.	MR. ABD RAZAK BIN HAJI MOHD YUSOFF	MASTER OF BUSINESS ADMINISTRATION	LECTURER
2.	MR. 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% Practical – 60%	Theory – 80% 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	<b>Knowledge:</b> apply knowledge of mathematics, science, engineering fundamentals and chemical engineering technology (process/food/polymer/bioprocess/environment) to defined and applied engineering procedures, processes, systems or methodologies; (SK1 to SK4)
PLO2	<b>Problem analysis:</b> Identify, formulate, research literature and analyse broadly-defined chemical engineering technology (process/food/polymer/bioprocess/environment) problems reaching substantiated conclusions using analytical tools appropriate to their discipline or area of specialisation; (SK1 to SK4)
PLO3	<b>Design/development of solutions:</b> Design solutions for broadly-defined chemical engineering technology (process/food/polymer/bioprocess/environment) problems and contribute to the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations;(SK5).
PLO4	<b>Investigation:</b> Conduct investigations of broadly-defined chemical engineering technology (process/food/polymer/ bioprocess/environment) problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions; (SK8)
PLO5	<b>Modern Tool Usage:</b> Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined chemical engineering technology (process/food/polymer/bioprocess/environment) problems, with an understanding of the limitations; (SK6)
PLO6	<b>The Engineer and Society:</b> Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technology practice and solutions to broadly-defined chemical engineering technology (process/food/polymer/bioprocess/environment) problems; (SK7)
PLO7	<b>Environment and Sustainability:</b> Understand the impact of engineering technology solutions of broadly-defined chemical engineering technology (process/food/polymer/bioprocess/environment) problems in societal and environmental context and demonstrate knowledge of and need for sustainable development; (SK7)
PLO8	<b>Ethics:</b> Understand and commit to professional ethics and responsibilities and norms of engineering technology practice; (SK7)
PLO9	<b>Individual and Team Work:</b> Function effectively as an individual, and as a member or leader in diverse technical teams;
PLO10	<b>Communications:</b> Communicate effectively on broadly-defined engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;

PLO11	<b>Project Management and Finance:</b> Demonstrate knowledge and understanding of engineering management principles, business practices, and technopreneurial competencies, as well as identify business opportunities, and apply these to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments;
PLO12	<b>Life Long Learning:</b> Recognize the need for, and have the ability to engage in independent and life-long learning in specialist technologies..

## **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 Hubungan Etnik ini bertujuan untuk melahirkan pelajar yang mempunyai pengetahuan dan penghayatan terhadap nilai-nilai mulia dan sejarah.

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

1. Menerangkan peranan pluraliti budaya, masyarakat dan kumpulan etnik dalam memupuk perpaduan
2. Mengenalpasti cabaran pluralisasi budaya dan pelaksanaannya dalam konteks permuafakatan sosial di Malaysia
3. Mengaplikasi kemahiran sosial dalam kalangan pelajar ke arah mewujudkan masyarakat bersatu padu
4. Menganalisis isu-isu dan cabaran dalam konteks hubungan etnik di Malaysia

### **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 the history of the nation and the development of socio-cultural aspects of society, politics and economy
2. Discuss the main components of the systems and the military administration of the country
3. Explain the historical and political process to achieve independence
4. Interpret the key government structure and its contribution to national development related to current issues happens in Malaysia.

### **MPU 3123 Tamadun Islam & Tamadun Asia (TITAS)**

#### **Rationale for inclusion of the course in the program:**

Kursus TITAS disediakan untuk melahirkan pelajar yang mempunyai pengetahuan dan penghayatan terhadap nilai-nilai mulia dan sejarah.

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

1. Menyenaraikan konsep-konsep utama Tamadun Islam dan Tamadun Asia.
2. Menerangkan kepentingan dan peranan agama dan budaya masing-masing dalam kehidupan.
3. Mengaplikasi kemahiran komunikasi secara berkesan dalam penulisan dan lisan di peringkat individu, kumpulan dan masyarakat.

### **MPU 3143 Bahasa Melayu Komunikasi 2**

#### **Rationale for inclusion of the course in the program:**

Kursus ini adalah untuk membolehkan pelajar menguasai kemahiran asas bahasa Melayu dan kecekapan berbahasa untuk berkomunikasi bagi melahirkan idea dan perasaan secara lisan dan penulisan.

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

1. Mengenal pasti sistem bunyi, sistem ejaan rumi, kosa kata dan tatabahasa bahasa Melayu dalam ayat mudah
2. Mendengar, memahami pertuturan dan bertutur dalam pelbagai situasi harian
3. Mengenal pasti teknik-teknik khusus berkomunikasi dalam perbualan formal atau tidak formal

### **MPU 3333 Isu-Isu Kontemporari Muslim Di Malaysia**

#### **Rationale for inclusion of the course in the program:**

Kursus ini memperkenalkan realiti dan cabaran masyarakat dalam menghayati Islam sebagai Ad-Deen. Pelbagai isu dan realiti umat Islam daripada sudut politik, ekonomi dan sosial yang melakari senario umat Islam di Malaysia dibincangkan. Kursus ini juga melangkau ke arah potensi kejayaan umat Islam dengan fakta-fakta dan dalil wahyu.

#### **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 dan isu-isu kontemporari yang melingkungi umat Islam di Malaysia
3. Menjelaskan peranan dan masa depan Islam dalam konteks semasa dan wahyu.

### **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. Distinguish acceptable cultural practices, norms and lifestyle in Malaysia
2. Demonstrate clear understanding of cultural values, ethnicity and lifestyle in Malaysia
3. Communicate information on cultural and lifestyles issues

### **MPU 3412 Career Guidance 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 enables students to understand the importance of career planning. It also promotes soft skills that can be applied in their future careers. Apart from that, it creates a better understanding about potential employer's expectations in job hunt.

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

1. Identify their personality types towards career & leadership
2. Determine ways in managing stress in the workplace
3. Demonstrate awareness of real work environment and the industry
4. Outline their future career and targets



**MPU 3422 Community Service 2****Rationale for inclusion of the course in the program:**

This course is one the co-curriculum modules offered to develop well-rounded individuals through involvement in high impact social and community activities. Specifically, it aims to develop interest among the students to participate in community service programmes. It also enables student to understand the importance of performing community service and the ways to implement the programmes and activities. Besides that, it provides better understanding to the students on the values, ethics and benefits of carrying out community service programmes.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Organize and participate in large scale/ high impact community service programmes and activities
2. Apply knowledge learnt in course in community service programmes and activities
3. Demonstrate entrepreneurship skills in community service programmes and activities
4. Explain the values, ethics and benefits of participating in community service programmes and activities.

**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 is one of the co-curriculum modules offered to develop well-rounded individuals through involvement in social and community activities. Specifically, it aims to give exposure to students on managing mosque effectively and implementing various activities related to the mosque. This is to enable students to play their role in developing the ummah through the mosque.

**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:**

This course is one of the co-curriculum modules offered to develop well-rounded individuals through involvement in social and community activities. Specifically, it gives exposure on the introduction to Malaysian Fire and Rescue Department, foot marching technique, fire rescue, ascending and descending technique and basic emergency aid.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Organize a project (theory and practically about BOMBA activities)
2. Communicate and demonstrate leadership and team skills through BOMBA activities (rescue, fire rescue and first aid)
3. Apply appropriate fundamental knowledge of rescue, fire rescue and first aid.

**MPU3462 Pasukan Siswa-Siswi Pertahanan Awam 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 gives exposure on the introduction to Malaysian Civil Defense Force, foot marching technique, fire rescue, ascending and descending technique and basic emergency aid.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Communicate and demonstrate leadership and team skills through BOMBA activities (rescue, fire rescue and first aid).
2. Participate actively in Project (theory and practically about JPAM activities).
3. Apply appropriate fundamental of rescue, fire rescue and first aid.

## **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:**

Rationale for inclusion of the course in the program: This course is to enable students to enhance their learning of English vocabulary; understand the structure of simple, compound and complex sentences; as well as explain and identify errors in sentences. This course also encourages students to share opinions and suggestions based on chosen text; and utilize vocabulary skills and basic writing in producing article review. Students will also be exposed to correct and effective presentation techniques

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

1. Acquire grammar and vocabulary skills to construct sentence structures
2. Produce an article review based on a chosen text
3. Present using appropriate presentation techniques

### **WEB 20202 Professional English 1**

#### **Rationale for inclusion of the course in the program:**

This module is aimed to enable students to utilize various skills in professional communication. The topics taught are business correspondence (business letters, proposals, memo, e-mail & fax) meetings and documentations of a meeting and job hunting skills.

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

1. Employ appropriate mechanics in writing business letters, memos, e-mails, faxes and proposals
2. Demonstrate the ability to conduct, participate and compile relevant information for meeting
3. Apply job hunting skills by preparing cover letter and resume, and promote oneself during interview

### **WEB 20302 Professional English 2**

#### **Rationale for inclusion of the course in the program:**

This course teaches students on effective report writing and how to utilize skills in writing a technical report. Students would be able to transfer information from linear to non-linear format. In addition, Students would be able to utilize all skills in identifying a personnel in the industry for information seeking activity via interview questions and interviewing techniques.

#### **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
3. Present information orally

### **MPU3242 Innovation Management**

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

This course is to help students to understand the complex process of innovation which depends on people and their interactions; to stimulate new thinking rather than prescribe some definitive methodology; to understand the issues involved in being an innovator and the culture for supporting innovation; understand the critical issues that organizations need to develop to support innovation; to be able to develop a marketing strategic planning and able to do qualitative and quantitative market analysis; to understand the process of product development and market testing; and to understand commercialization strategy i.e. marketing mix and future plan. These teaching components would benefit the students in becoming future entrepreneurs.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Explain the importance of innovation in organisation
2. Analyse the different types of innovation, products classes and the impact to the industry.
3. Distinguish the steps in the innovation process
4. Assess the key challenges to innovation.
5. Develop a viable innovative project.

**WMD10101 Mandarin 1****Rationale for inclusion of the course in the program:**

Having a basic command of Mandarin will enhance learners' communicative ability, which enables them to have an extra edge in the job market. Thus, the objective of the course is to introduce basic Chinese with emphasis on conversations, which will enable the learner to exchange conversations in structured sentences.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Use Mandarin in simple conversation, express feelings and emotions as well as exchange opinions
2. Write basic Chinese characters.

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

Having a basic command of Mandarin will enhance learners' communicative ability, which enables them to have an extra edge in the job market. Thus, the objective of the course is to introduce basic Chinese with emphasis on conversation, which will enable learners to exchange conversations in structured sentences using slightly difficult vocabularies.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Use Mandarin in a more complex conversation, express feelings and emotions as well as exchange opinions
2. Write Chinese characters.

**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 and write basic Arabic sentences and questions based on what they have learnt in the course
2. 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 and Communicate in basic Arabic language in written and verbal form.
2. 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. Describe the basic of trigonometry functions, derivatives and integrations.
2. Apply the skills to solve problems in chemicals and process engineering.
3. Solve derivatives and integration for various types of functions.

### **WBB20103 Technopreneurship**

#### **Rationale for inclusion of the course in the program:**

Across the world, entrepreneurial ventures are creating and bringing to market new products and services that make our lives easier, enhance our productivity at work, improve our health, and entertain us in new and fascinating ways. Thus, the purpose of this course is to provide students with a thoughtful, practical guide to the process of successfully launching and growing an entrepreneurial venture. In order to achieve this, the course provides students with a thorough analysis of the entrepreneurial process.

#### **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. Discuss the results of experimental work that based on basic energy concept in the following topics; thermodynamic, equilibrium concept and chemical kinetic.
3. Collaborate with team members in performing a good laboratory techniques such as planning, running, observing, recording, interpreting, evaluating and reporting data effectively.

**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 advanced differentiation questions such as gradient functions, rate of changes, small increment and approximation by using implicit differential, total differential and second order derivatives.
2. Solve differential equations by using the properties of the Laplace Transform, evaluation and the use of inverse of Laplace Transform.
3. Sketch area under one curve, volumes of solid revolution, numerical integration and find the solutions.
4. Solve the problems for first order differential equations and second order differential problems.

**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. State and apply the phenomena, basic concepts, laws and principles in analytical and organic chemistry.
2. Handle chemicals and perform experiments effectively.
3. Analyze and interpret organic compounds from analysis output using analytical equipment.

**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 will provide 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. Estimate the impacts of natural and anthropogenic activities towards the environment.
2. Analyze various environmental processes and engineering technology applications in mitigating, controlling and treating pollutions.
3. Perform group works on environmental quality analysis techniques in the laboratory or fieldworks to quantify various environmental systems.

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

**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. Organize known information about process variables on individual process units and multiple-unit processes.
2. Solve material balances and energy balances to account for the flows to and from the process and its units.
3. Examine and analyze pertinent data to solve material and energy balance problems.

### **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. Adapt their lesson on statistical software to analyze data
4. Solve practical problems involving statistical data.

### **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. Practice 3D assembly and documentation using CAD software.
2. Produce 2D drawing of process plant layout using CAD software.
3. Demonstrate 2D and 3D process plant drawing including equipment, piping and structure.

### **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. Differentiate various types of process instrumentation and control system based on real applications in chemical industries.
2. Evaluate results, graphs and controller tuning data obtained from practical session to provide valid conclusion.
3. Demonstrate understanding towards the importance of employing appropriate process instrumentation and control in chemical industries

**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. Design chemical reactors for isothermal and non-isothermal processes.
2. Solve problems related to chemical reactions based on the fundamental concepts.
3. Follow procedures accurately and conduct 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. Analyse engineering problem based on thermodynamics principles and concepts and solve it by using thermodynamics property tables and figures.
2. Perform laboratory experiments and relate the collected data with thermodynamic tables and figures.
3. Solve problems related to the application of thermodynamics.

**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. Show ability to identify problems, formulate solutions and solve using heat and mass transfer principles.
2. Perform laboratory experiments and relate the collected data with the concepts and laws of heat and mass transfer.
3. Design heat and mass transfer equipment and solve engineering problems related to heat and mass transfer.

### **CPB49804 Final Year Project (Proposal)**

#### **Rationale for inclusion of the course in the program:**

This course introduces students with ability and skills in conducting a technical project based on their specialization area. Its provide students with technical writing and presentation skills

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

1. Demonstrate the abilities to plan and to work effectively
2. Analyze 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 standard 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:**

This course is a progression of FYP1 focussing on enhancing the abilities and skills in conducting project based on their specialization area. It provides students with technical writing and presentation skills

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

1. Manage and execute project plan in solving research problems
2. Analyse project results using appropriate technique or
3. Produce a project report in accordance to the specified standard format.
4. Present and defend project outcomes effectively.

# PROGRAM STRUCTURE

# BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN PROCESS

## **1. Program Structure**

## **2. Major Courses**

# PROGRAM STRUCTURE

- *subject to amendments*

INSTITUTE						
UNIVERSITI KUALA LUMPUR KAMPUS CWGN MALAYSIAN INSTITUTE OF CHEMICAL AND BIOENGINEERING TECHNOLOGY						
PROGRAMME						
BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (PROCESS) WITH HONOURS						
Intake From Semester 2020/2021-1				Until Sem		2021/2022-2
Total Credits to Grad		140		No. of Semester		8
						Elective Credits 9
YEAR	SEM NO.	NEW CODE	NAME	CREDIT	CHOICE	CATEGORY
1	1	1	CLB10903 ENGINEERING DRAWING & COMPUTING	3	N	CORE
		2	CLB19203 MATHEMATICS 1	3	N	CORE
		3	CLB40002 ENGINEERING TECHNOLOGIST IN SOCIETY	2	N	CORE
		4	MPU3123 TAMADUN ISLAM & TAMADUN ASIA (TTAS)	3	N	MPU
		5	MPU3143 BAHASA MELAYU KOMUNIKASI 2	3	Y	MPU
		6	WAD10101 ARABIC 1	1	Y	UCS(L)
		7	WEB10302 FUNDAMENTAL ENGLISH	2	N	UCS
		8	WEB20202 PROFESSIONAL ENGLISH 1	2	N	UCS
		9	WMD10101 MANDARIN 1	1	N	UCS(L)
	2	10	CLB10703 PHYSICAL CHEMISTRY	3	N	CORE
		12	CLB11003 FLUID MECHANICS	3	N	CORE
		14	CLB21403 ENGINEERING DESIGN	3	N	CORE
		16	MPU3173 PENGAJIAN MALAYSIA 3	3	Y	MPU
		17	WAD10201 ARABIC 2	1	Y	UCS(L)
		18	WMD10201 MANDARIN 2	1	N	UCS(L)
	3	19	CEB20003 INTRODUCTION TO ENVIRONMENTAL ENGINEERING	3	N	CORE
		20	CLB10402 FUNDAMENTALS OF ELECTRICAL & ELECTRONICS	2	N	CORE
		21	CLB10803 ANALYTICAL & ORGANIC CHEMISTRY	3	N	CORE
		22	CLB20403 THERMODYNAMICS	3	N	CORE
		23	CLB21204 TRANSPORT PROCESS PRINCIPLES	4	N	CORE
		24	MPU3333 ISU-ISU KONTEMPORARI MUSLIM DI MALAYSIA	3	N	MPU
		25	MPU3343 CULTURE AND LIFESTYLE IN MALAYSIA 2	3	Y	MPU
	4	26	CKB20104 REACTION ENGINEERING	4	N	CORE
		27	CKB30103 INDUSTRIAL SAFETY & HEALTH	3	N	CORE
		28	CPB21404 SEPARATION PROCESS	4	N	CORE
		29	CPB40003 INTRODUCTION TO RENEWABLE ENERGY	3	N	CORE
		30	MPU34102 INTEGRITI & ANTI-RASUAH 2	2	Y	MPU
		31	MPU3412 CAREER GUIDANCE 2	2	Y	MPU
		32	MPU3422 COMMUNITY SERVICE 2	2	Y	MPU
		33	MPU3432 CULTURE 2	2	Y	MPU
		34	MPU3442 RAKAN MASJID 2	2	Y	MPU
		35	MPU3452 SISWA SISWI BOMBA DAN PENYELAMAT 2	2	Y	MPU
		36	MPU3462 KOR SISWA SISWI PERTAHANAN AWAM 2	2	Y	MPU
		37	MPU3472 SPORTS MANAGEMENT 2	2	Y	MPU
		38	MPU3482 PERSONAL FINANCIAL MANAGEMENT 2	2	Y	MPU
		39	MPU3492 ASKAR WATANIAH	2	Y	MPU
		40	WEB20302 PROFESSIONAL ENGLISH 2	2	N	UCS
3	5	41	CLB21303 PROCESS INSTRUMENTATION & CONTROL	3	N	CORE
		42	CPB20203 NUMERICAL METHODS IN CHEMICAL ENGINEERING	3	N	CORE
		43	CPB20403 PLANT UTILITIES & MAINTENANCE	3	N	CORE
		44	CPB30004 PROCESS DYNAMICS & CONTROL	4	N	CORE
		45	CPB30703 DESIGN PROJECT 1 (DESIGN & FEASIBILITY STUDY)	3	N	CORE
		46	WBB20103 TECHNOPRENEURSHIP	3	N	CORE
	6	47	CJB40403 MANAGEMENT FOR CHEMICAL ENGINEERING TECH	3	Y	ELECTIVE
		48	CLB20903 ENGINEERING STATISTICS	3	N	CORE
		49	CPB30303 OIL & FAT PROCESS TECHNOLOGY	3	N	CORE
		50	CPB30404 DESIGN PROJECT 2 (PLANT & PROCESS OPTIMIZATI	4	N	CORE
		51	CPB30503 PETROCHEMICALS & PETROLEUM REFINING TECHNC	3	N	CORE
		52	CPB40203 PROCESS SAFETY MANAGEMENT 1	3	Y	ELECTIVE
		53	CPB49804 FINAL YEAR PROJECT 1	4	N	FYP
	7	54	CBB30703 ENZYME TECHNOLOGY	3	Y	ELECTIVE
		55	CBB40403 FORENSIC ANALYTICAL CHEMISTRY	3	Y	ELECTIVE
		56	CBB40503 FORENSIC MOLECULAR BIOLOGY	3	Y	ELECTIVE
		57	CBB40603 BIOINFORMATICS	3	Y	ELECTIVE
		58	CBB40703 FORMULATION OF COSMETICS AND HEALTHCARE P	3	Y	ELECTIVE
		59	CBB40803 COSMETIC AND HEALTHCARE PRODUCT DEVELOPM	3	Y	ELECTIVE
		60	CBB40903 HALAL COSMETICS AND HEALTHCARE PRODUCTS	3	Y	ELECTIVE
		61	CEB30203 ENVIRONMENTAL IMPACT ASSESSMENT	3	Y	ELECTIVE
		62	CEB30403 AIR POLLUTION CONTROL TECHNOLOGY	3	Y	ELECTIVE
		63	CEB30503 WASTEWATER TREATMENT TECHNOLOGY	3	Y	ELECTIVE
4	8	64	CFB31303 HAZARD ANALYSIS CRITICAL CONTROL POINT	3	Y	ELECTIVE
		65	CJB40303 PHYTOPHARMACEUTICAL TECHNOLOGY	3	Y	ELECTIVE
		66	CJB40503 MARKETING FOR CHEMICAL TECHNOLOGISTS	3	Y	ELECTIVE
		67	CJB40803 CHEMICAL ENGINEERING TECHNOLOGIST ORGANIZ	3	Y	ELECTIVE
		68	CPB30103 BIOCHEMICAL ENGINEERING	3	N	CORE
		69	CPB30603 QA & QC IN CHEMICAL ENGINEERING	3	N	CORE
		70	CPB40303 PROCESS SAFETY MANAGEMENT 2	3	Y	ELECTIVE
		71	CPB40403 PROCESS SAFETY MANAGEMENT 3	3	Y	ELECTIVE
		72	CPB49906 FINAL YEAR PROJECT 2	6	N	FYP
		73	CRB40203 RUBBER ENGINEERING	3	Y	ELECTIVE
		74	CRB40503 BIO-POLYMER	3	Y	ELECTIVE
		75	MPU3213 BAHASA KEBANGSAAN A	3	Y	MPU
		76	MPU3242 INNOVATION MANAGEMENT	2	N	MPU
	8	77	WIB41009 INDUSTRIAL TRAINING	9	N	INTRA

**SUMMARY TOTAL NUMBER OF SUBJECTS UNDER CATEGORIES :**

CATEGORIES	TOTAL
MPU	17
FYP	2
ELECTIVE	20
UCS(L)	4
UCS	3
CORE	29
INTRA	1

**Total Credit to Graduate (TCG): 140 Credit Hours**

# 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. Identify the sources and importance of renewable energy
2. Recognise the processes to 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*



INSTITUTE UNIVERSITI KUALA LUMPUR KAMPUS CWGN MALAYSIAN INSTITUTE OF CHEMICAL AND BIOENGINEERING TECHNOLOGY						
PROGRAMM BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (ENVIRONMENT) WITH HONOURS						
Intake From Semeste 2022/2023-1				Until Sem 025/2026-3		
Total Credits to Gradus:			140 No. of Semester 8		Elective Credits	
YEAR	SEM NO.		NEW CODE	NAME	CREDIT	CHOICE CATEGORY
1	1	1	CLB10903	ENGINEERING DRAWING & COMPUTING	3	N CORE
		2	CLB19203	MATHEMATICS 1	3	N CORE
		3	CLB40002	ENGINEERING TECHNOLOGIST IN SOCIETY	2	N CORE
		4	MPU3142	BAHASA MELAYU KOMUNIKASI 2	2	Y MPU
		5	MPU3182	PENGHAYATAN ETIKA DAN PERADABAN	2	Y MPU
		6	MPU3192	PHILOSOPHY AND CURRENT ISSUES	2	N MPU
		7	WAD10101	ARABIC 1	1	Y UCS(L)
		8	WEB10302	FUNDAMENTAL ENGLISH	2	N UCS
		9	WMD10101	MANDARIN 1	1	N UCS(L)
	2	10	CLB10703	PHYSICAL CHEMISTRY	3	N CORE
		11	CLB10904	CHEMICAL PROCESS PRINCIPLES	4	N CORE
		12	CLB11003	FLUID MECHANICS	3	N CORE
		13	CLB19303	MATHEMATICS 2	3	N CORE
		14	CLB21403	ENGINEERING DESIGN	3	N CORE
		15	WAD10201	ARABIC 2	1	Y UCS(L)
		16	WEB20202	PROFESSIONAL ENGLISH 1	2	N UCS
		17	WMD10201	MANDARIN 2	1	N UCS(L)
2	3	18	CEB20003	INTRODUCTION TO ENVIRONMENTAL ENGINEERING TECHNOLOGY	3	N CORE
		19	CLB10402	FUNDAMENTALS OF ELECTRICAL & ELECTRONICS	2	N CORE
		20	CLB10803	ANALYTICAL & ORGANIC CHEMISTRY	3	N CORE
		21	CLB20403	THERMODYNAMICS	3	N CORE
		22	CLB21204	TRANSPORT PROCESS PRINCIPLES	4	N CORE
		23	MPU3332	ISU-ISU KONTEMPORARI MUSLIM DI MALAYSIA	2	Y MPU
	4	24	MPU3342	CULTURE AND LIFESTYLE IN MALAYSIA 2	2	Y MPU
		25	CEB20103	SURFACE AND GROUNDWATER HYDROLOGY	3	N CORE
		26	CEB20303	ENVIRONMENTAL MICROBIOLOGY & CHEMISTRY	3	N CORE
		27	CEB30003	ENVIRONMENTAL MANAGEMENT SYSTEM	3	N CORE
		28	CKB20104	REACTION ENGINEERING	4	N CORE
		29	CKB30103	INDUSTRIAL SAFETY & HEALTH	3	N CORE
		30	MPU34102	INTEGRITI & ANTI-RASUAH 2	2	Y MPU
		31	MPU3412	CAREER GUIDANCE 2	2	Y MPU
		32	MPU3422	COMMUNITY SERVICE 2	2	Y MPU
		33	MPU3432	CULTURE 2	2	Y MPU
		34	MPU3442	RAKAN MASJID 2	2	Y MPU
		35	MPU3452	SISWA SISWI BOMBA DAN PENYELAMAT 2	2	Y MPU
		36	MPU3462	KOR SISWA SISWI PERTAHANAN AWAM 2	2	Y MPU
		37	MPU3472	SPORTS MANAGEMENT 2	2	Y MPU
		38	MPU3482	PERSONAL FINANCIAL MANAGEMENT 2	2	Y MPU
		39	MPU3492	ASKAR WATANIAH	2	Y MPU
		40	WEB20302	PROFESSIONAL ENGLISH 2	2	N UCS
		41	CEB30403	AIR POLLUTION CONTROL TECHNOLOGY	3	N CORE
	5	42	CEB30703	WATER TREATMENT TECHNOLOGY	3	N CORE
		43	CEB30903	SOLID AND HAZARDOUS WASTE MANAGEMENT	3	N CORE
		44	CEB40503	REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM IN ENVIRONMENTAL	3	N CORE
		45	CLB21303	PROCESS INSTRUMENTATION & CONTROL	3	N CORE
		46	WBB20103	TECHNOPRENEURSHIP	3	N CORE
	6	47	CEB30503	WASTEWATER TREATMENT TECHNOLOGY	3	N CORE
		48	CEB31303	LIFE CYCLE ANALYSIS ENVIRONMENTAL ENGINEERING TECHNOLOGY	3	N CORE
		49	CEB31503	ENVIRONMENTAL TOXICOLOGY AND PUBLIC HEALTH	3	N ELECTIVE
		50	CLB20903	ENGINEERING STATISTICS	3	N CORE
		51	CPB30303	OIL & FAT PROCESS TECHNOLOGY	3	N CORE
		52	CPB40203	PROCESS SAFETY MANAGEMENT 1	3	Y ELECTIVE
		53	CPB49804	FINAL YEAR PROJECT 1	4	N FYP
	7	54	CBB30703	ENZYME TECHNOLOGY	3	Y ELECTIVE
		55	CBB40403	FORENSIC ANALYTICAL CHEMISTRY	3	Y ELECTIVE
		56	CBB40503	FORENSIC MOLECULAR BIOLOGY	3	Y ELECTIVE
		57	CBB40603	BIOINFORMATICS	3	Y ELECTIVE
		58	CBB40703	FORMULATION OF COSMETICS AND HEALTHCARE PRODUCTS	3	Y ELECTIVE
		59	CBB40803	COSMETIC AND HEALTHCARE PRODUCT DEVELOPMENT PROCESS	3	Y ELECTIVE
		60	CBB40903	HALAL COSMETICS AND HEALTHCARE PRODUCTS	3	Y ELECTIVE
		61	CEB30103	POLLUTION PREVENTION & INDUSTRIAL WASTE MINIMIZATION	3	N CORE
		62	CEB30203	ENVIRONMENTAL IMPACT ASSESSMENT	3	Y ELECTIVE
		63	CEB40003	ENVIRONMENTAL ENGINEERING DESIGN	3	N CORE
		64	CEB40603	INTRODUCTION TO RENEWABLE ENERGY	3	N ELECTIVE
		65	CFB31303	HAZARD ANALYSIS CRITICAL CONTROL POINT	3	Y ELECTIVE
		66	CJB40303	PHYTOPHARMACEUTICAL TECHNOLOGY	3	Y ELECTIVE
		67	CJB40403	MANAGEMENT FOR CHEMICAL ENGINEERING TECHNOLOGISTS	3	Y ELECTIVE
		68	CJB40503	MARKETING FOR CHEMICAL TECHNOLOGISTS	3	Y ELECTIVE
		69	CJB40803	CHEMICAL ENGINEERING TECHNOLOGIST ORGANIZATIONAL BEHAVIOUR	3	Y ELECTIVE
		70	CPB40303	PROCESS SAFETY MANAGEMENT 2	3	Y ELECTIVE
		71	CPB40403	PROCESS SAFETY MANAGEMENT 3	3	Y ELECTIVE
		72	CPB49906	FINAL YEAR PROJECT 2	6	N FYP
		73	CRB40203	RUBBER ENGINEERING	3	Y ELECTIVE
		74	CRB40503	BIO-POLYMER	3	Y ELECTIVE
4	8	75	MPU3212	BAHASA KEBANGSAAN A	2	Y MPU
		76	MPU3242	INNOVATION MANAGEMENT	2	N MPU
	8	77	WIB41012	INDUSTRIAL TRAINING	12	N INTRA

**SUMMARY TOTAL NUMBER OF SUBJECTS UNDER CATEGORIES :**

CATEGORIES	TOTAL
MPU	17
FYP	2
ELECTIVE	20
UCS(L)	4
UCS	3
CORE	30
INTRA	1

**Total Credit to Graduate (TCG): 140 Credit Hours**

# 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 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:**

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 measures 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. Appraise the various components in environmental management systems and EQA 1974.
2. Analyze and document environmental aspects and impacts for selected activities.
3. Measure the level of environmental management system implementation by applying standard environmental auditing principles and practices to environmental management system.

**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. Characterize 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. Describe the current issues in air pollution and perform air quality monitoring and evaluate the results based on sound 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. Distinguish the primary and secondary standards for treated wastewater effluent towards compliance discharge standards.
2. Perform different physiochemical and biological wastewater treatment processes.
3. Select and apply appropriate techniques to design a complete wastewater treatment plant
4. Communicate effectively through the preparation of reports and 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:**

Building upon foundation laid by solid and hazardous waste management and LCA courses, this course seeks to provide a more in-depth analysis and application of generic pollution prevention and waste minimization methods focusing on the petrochemical industry. The skills obtained in this course are essential for any successful pollution prevention and waste minimization program to be conducted by the student in the future job. Due to the generic nature of the methods the principles are applicable in a wide range of industrial sectors.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Develop concepts and solutions of industrial pollution prevention, industrial ecology and waste minimization at macro- and mesoscale using appropriate resources.
2. Discuss the need of legislative acts related to pollution prevention and waste minimization for 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. Revise the principle aspects of waste management, relevant issues and implications related to solid and hazardous waste management.
2. Differentiate the principle of waste processing, treatment, transformation, recovery and disposal operation technologies for sustainable development.
3. Organize suitable waste program/project to include potential economic aspects of waste as resources.
4. Ability to identify problems and also potential engineering solutions

**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

INSTITUTE		UNIVERSITI KUALA LUMPUR KAMPUS CWGN MALAYSIAN INSTITUTE OF CHEMICAL AND BIOENGINEERING TECHNOLOGY				
PROGRAMME		BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (POLYMER) WITH HONOURS				
Intake From Semester		2022/2023-1		Jntil Sem		2025/2026-3
Total Credits to Gradu		140		No. of Semester 8		Elective Credits 9
YEAR	SEM NO.	NEW CODE	NAME	CREDIT	CHOICE	CATEGORY
1	1	1	CLB10903 ENGINEERING DRAWING & COMPUTING	3	N	CORE
		2	CLB19203 MATHEMATICS 1	3	N	CORE
		3	CLB40002 ENGINEERING TECHNOLOGIST IN SOCIETY	2	N	CORE
		4	MPU3142 BAHASA MELAYU KOMUNIKASI 2	2	Y	MPU
		5	MPU3182 PENGHAYATAN ETIKA DAN PERADABAN	2	Y	MPU
		6	MPU3192 PHILOSOPHY AND CURRENT ISSUES	2	N	MPU
		7	WAD1010 ARABIC 1	1	Y	UCS(L)
		8	WEB10302 FUNDAMENTAL ENGLISH	2	N	UCS
		9	WMD1010 MANDARIN 1	1	N	UCS(L)
	2	10	CLB10703 PHYSICAL CHEMISTRY	3	N	CORE
		11	CLB10904 CHEMICAL PROCESS PRINCIPLES	4	N	CORE
		12	CLB11003 FLUID MECHANICS	3	N	CORE
		13	CLB19303 MATHEMATICS 2	3	N	CORE
		14	CLB21403 ENGINEERING DESIGN	3	N	CORE
		15	WAD1020 ARABIC 2	1	Y	UCS(L)
		16	WEB20202 PROFESSIONAL ENGLISH 1	2	N	UCS
		17	WMD1020 MANDARIN 2	1	N	UCS(L)
2	3	18	CEB20003 INTRODUCTION TO ENVIRONMENTAL ENGINEERING TECHNOLOGY	3	N	CORE
		19	CLB10402 FUNDAMENTALS OF ELECTRICAL & ELECTRONICS	2	N	CORE
		20	CLB10803 ANALYTICAL & ORGANIC CHEMISTRY	3	N	CORE
		21	CLB20403 THERMODYNAMICS	3	N	CORE
		22	CLB21204 TRANSPORT PROCESS PRINCIPLES	4	N	CORE
		23	MPU3332 ISU-ISU KONTEMPORARI MUSLIM DI MALAYSIA	2	Y	MPU
	4	24	MPU3342 CULTURE AND LIFESTYLE IN MALAYSIA 2	2	Y	MPU
		25	CKB20104 REACTION ENGINEERING	4	N	CORE
		26	CKB30103 INDUSTRIAL SAFETY & HEALTH	3	N	CORE
		27	CRB20003 INTRODUCTION TO POLYMER SCIENCE & TECHNOLOGY	3	N	CORE
		28	CRB30003 COMPOSITE TECHNOLOGY	3	N	CORE
		29	CRB30203 PLASTIC PROCESSING	3	N	CORE
		30	MPU34102 INTEGRITI & ANTI-RASUAH 2	2	Y	MPU
		31	MPU3412 CAREER GUIDANCE 2	2	Y	MPU
		32	MPU3422 COMMUNITY SERVICE 2	2	Y	MPU
		33	MPU3432 CULTURE 2	2	Y	MPU
		34	MPU3442 RAKAN MASJID 2	2	Y	MPU
		35	MPU3452 SISWA SISWI BOMBA DAN PENYELAMAT 2	2	Y	MPU
		36	MPU3462 KOR SISWA SISWI PERTAHANAN AWAM 2	2	Y	MPU
		37	MPU3472 SPORTS MANAGEMENT 2	2	Y	MPU
		38	MPU3482 PERSONAL FINANCIAL MANAGEMENT 2	2	Y	MPU
		39	MPU3492 ASKAR WATANIAH	2	Y	MPU
		40	WEB20302 PROFESSIONAL ENGLISH 2	2	N	UCS
3	5	41	CLB21303 PROCESS INSTRUMENTATION & CONTROL	3	N	CORE
		42	CRB20103 LATEX TECHNOLOGY	3	N	CORE
		43	CRB30103 POLYMER SYNTHESIS	3	N	CORE
		44	CRB30303 RUBBER TECHNOLOGY	3	N	CORE
		45	CRB30603 POLYMER RHEOLOGY	3	N	CORE
		46	WBB20103 TECHNOPRENEURSHIP	3	N	CORE
	6	47	CJB40403 MANAGEMENT FOR CHEMICAL ENGINEERING TECHNOLOGISTS	3	Y	ELECTIVE
		48	CLB20903 ENGINEERING STATISTICS	3	N	CORE
		49	CPB30303 OIL & FAT PROCESS TECHNOLOGY	3	N	CORE
		50	CPB40203 PROCESS SAFETY MANAGEMENT 1	3	Y	ELECTIVE
		51	CPB49804 FINAL YEAR PROJECT 1	4	N	FYP
		52	CRB30403 POLYMER REACTION ENGINEERING	3	N	CORE
		53	CRB30803 POLYMERIC MATERIAL DESIGN 1	3	N	CORE
4	7	54	CBB30703 ENZYME TECHNOLOGY	3	Y	ELECTIVE
		55	CBB40403 FORENSIC ANALYTICAL CHEMISTRY	3	Y	ELECTIVE
		56	CBB40503 FORENSIC MOLECULAR BIOLOGY	3	Y	ELECTIVE
		57	CBB40603 BIOINFORMATICS	3	Y	ELECTIVE
		58	CBB40703 FORMULATION OF COSMETICS AND HEALTHCARE PRODUCTS	3	Y	ELECTIVE
		59	CBB40803 COSMETIC AND HEALTHCARE PRODUCT DEVELOPMENT PROCESS	3	Y	ELECTIVE
		60	CBB40903 HALAL COSMETICS AND HEALTHCARE PRODUCTS	3	Y	ELECTIVE
		61	CEB30203 ENVIRONMENTAL IMPACT ASSESSMENT	3	Y	ELECTIVE
		62	CEB30403 AIR POLLUTION CONTROL TECHNOLOGY	3	Y	ELECTIVE
		63	CEB30503 WASTEWATER TREATMENT TECHNOLOGY	3	Y	ELECTIVE
		64	CFB31303 HAZARD ANALYSIS CRITICAL CONTROL POINT	3	Y	ELECTIVE
		65	CJB40303 PHYTOPHARMACEUTICAL TECHNOLOGY	3	Y	ELECTIVE
		66	CJB40503 MARKETING FOR CHEMICAL TECHNOLOGISTS	3	Y	ELECTIVE
		67	CJB40803 CHEMICAL ENGINEERING TECHNOLOGIST ORGANIZATIONAL BEHAV	3	Y	ELECTIVE
		68	CPB40303 PROCESS SAFETY MANAGEMENT 2	3	Y	ELECTIVE
		69	CPB40403 PROCESS SAFETY MANAGEMENT 3	3	Y	ELECTIVE
		70	CPB49906 FINAL YEAR PROJECT 2	6	N	FYP
		71	CRB40003 MOLD AND DIE DESIGN	3	N	CORE
		72	CRB40203 RUBBER ENGINEERING	3	Y	ELECTIVE
		73	CRB40503 BIO-POLYMER	3	Y	ELECTIVE
		74	CRB40603 POLYMERIC MATERIAL DESIGN 2	3	N	CORE
		75	MPU3212 BAHASA KEBANGSAAN A	2	Y	MPU
		76	MPU3242 INNOVATION MANAGEMENT	2	N	MPU
		77	WIB41012 INDUSTRIAL TRAINING	12	N	INTRA

**SUMMARY TOTAL NUMBER OF SUBJECTS UNDER CATEGORIES :**

CATEGORIES	TOTAL
MPU	17
FYP	2
ELECTIVE	20
UCS(L)	4
UCS	3
CORE	30
INTRA	1

**Total Credit to Graduate (TCG): 140 Credit Hours**

# 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
2. Evaluate test results using fundamental knowledge of latex science and technology
3. Discuss latex products manufacturing techniques.
4. Perform correct laboratory works and embedding technopreneurial element in selected laboratory report.

**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 and contrast 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 various types of rubber, its properties and its applications.
2. Review on selected rubber processing methods and the remedies for typical defects.
3. Evaluate rubber compound and/or rubber vulcanizate performances based on test results.
4. Demonstrate the typical rubber processing and testing on rubber compounds and/or rubber vulcanizates as a team

**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 technoprenuerial 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

INSTITUTE UNIVERSITI KUALA LUMPUR KAMPUS CWGN MALAYSIAN INSTITUTE OF CHEMICAL AND BIOENGINEERING TECHNOLOGY						
PROGRAMME BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (BIOPROCESS) WITH HONOURS						
Intake From Semester 2022/2023-1				Until Sem 2025/2026-3		
Total Credits to Graduate (TCG) 140				No. of Semester 8		Elective Credits 9
YEAR	SEM NO.	NEW CODE	NAME	CREDIT	CHOICE	CATEGORY
1	1	1 CLB10903	ENGINEERING DRAWING & COMPUTING	3	N	CORE
		2 CLB19203	MATHEMATICS 1	3	N	CORE
		3 CLB40002	ENGINEERING TECHNOLOGIST IN SOCIETY	2	N	CORE
		4 MPU3142	BAHASA MELAYU KOMUNIKASI 2	2	Y	MPU
		5 MPU3182	PENGHAYATAN ETIKA DAN PERADABAN	2	Y	MPU
		6 MPU3192	PHILOSOPHY AND CURRENT ISSUES	2	N	MPU
		7 WAD10101	ARABIC 1	1	Y	UCS(L)
	2	8 WEB10302	FUNDAMENTAL ENGLISH	2	N	UCS
		9 WMD10101	MANDARIN 1	1	N	UCS(L)
		10 CLB10703	PHYSICAL CHEMISTRY	3	N	CORE
		11 CLB10904	CHEMICAL PROCESS PRINCIPLES	4	N	CORE
		12 CLB11003	FLUID MECHANICS	3	N	CORE
		13 CLB19303	MATHEMATICS 2	3	N	CORE
		14 CLB21403	ENGINEERING DESIGN	3	N	CORE
		15 WAD10201	ARABIC 2	1	Y	UCS(L)
		16 WEB20202	PROFESSIONAL ENGLISH 1	2	N	UCS
		17 WMD10201	MANDARIN 2	1	N	UCS(L)
2	3	18 CEB20003	INTRODUCTION TO ENVIRONMENTAL ENGINEERING TECHNOLOGY	3	N	CORE
		19 CLB10402	FUNDAMENTALS OF ELECTRICAL & ELECTRONICS	2	N	CORE
		20 CLB10803	ANALYTICAL & ORGANIC CHEMISTRY	3	N	CORE
		21 CLB11103	BIOLOGY OF CELLS	3	N	CORE
		22 CLB20403	THERMODYNAMICS	3	N	CORE
		23 CLB21204	TRANSPORT PROCESS PRINCIPLES	4	N	CORE
		24 MPU3332	ISU-ISU KONTEMPORARI MUSLIM DI MALAYSIA	2	Y	MPU
	4	25 MPU3342	CULTURE AND LIFESTYLE IN MALAYSIA 2	2	Y	MPU
		26 CBB20003	PRINCIPLES OF MICROBIOLOGY	3	N	CORE
		27 CBB20303	BIOCHEMISTRY	3	N	CORE
		28 CBB20503	PRINCIPLES OF BIOPROCESS TECHNOLOGY	3	N	CORE
		29 CKB20104	REACTION ENGINEERING	4	N	CORE
		30 CKB30103	INDUSTRIAL SAFETY & HEALTH	3	N	CORE
		31 MPU34102	INTEGRITI & ANTI-RASUAH 2	2	Y	MPU
		32 MPU3412	CAREER GUIDANCE 2	2	Y	MPU
		33 MPU3422	COMMUNITY SERVICE 2	2	Y	MPU
		34 MPU3432	CULTURE 2	2	Y	MPU
		35 MPU3442	RAKAN MASJID 2	2	Y	MPU
		36 MPU3452	SISWA SISWI BOMBA DAN PENYELAMAT 2	2	Y	MPU
		37 MPU3462	KOR SISWA SISWI PERTAHANAN AWAM 2	2	Y	MPU
		38 MPU3472	SPORTS MANAGEMENT 2	2	Y	MPU
		39 MPU3482	PERSONAL FINANCIAL MANAGEMENT 2	2	Y	MPU
		40 MPU3492	ASKAR WATANIAH	2	Y	MPU
		41 WEB20302	PROFESSIONAL ENGLISH 2	2	N	UCS
3	5	42 CBB30204	BIOSEPARATIONS ENGINEERING TECHNOLOGY	4	N	CORE
		43 CBB30303	BIOMOLECULAR TECHNIQUES	3	Y	CORE
		44 CBB31104	BIOPROCESS DEVELOPMENT & EQUIPMENT	4	N	CORE
		45 CLB21303	PROCESS INSTRUMENTATION & CONTROL	3	N	CORE
		46 CSB30603	QA & QC IN BIO PRODUCTS	3	N	CORE
		47 WBB20103	TECHNOPRENEURSHIP	3	N	CORE
	6	48 CBB30703	ENZYME TECHNOLOGY	3	Y	ELECTIVE
		49 CBB31003	BIOPLANT DESIGN PROJECT 1	3	N	CORE
		50 CEB30203	ENVIRONMENTAL IMPACT ASSESSMENT	3	Y	ELECTIVE
		51 CFB31303	HAZARD ANALYSIS CRITICAL CONTROL POINT	3	Y	ELECTIVE
		52 CJB40403	MANAGEMENT FOR CHEMICAL ENGINEERING TECHNOLOGISTS	3	Y	ELECTIVE
		53 CJB40503	MARKETING FOR CHEMICAL TECHNOLOGISTS	3	Y	ELECTIVE
		54 CJB40803	CHEMICAL ENGINEERING TECHNOLOGIST ORGANIZATIONAL BEHAVIOUR	3	Y	ELECTIVE
		55 CLB20903	ENGINEERING STATISTICS	3	N	CORE
		56 CPB30303	OIL & FAT PROCESS TECHNOLOGY	3	N	CORE
		57 CPB40203	PROCESS SAFETY MANAGEMENT 1	3	Y	ELECTIVE
		58 CPB49804	FINAL YEAR PROJECT 1	4	N	FYP
		59 CRB40503	BIO-POLYMER	3	Y	ELECTIVE
4	7	60 CBB40104	BIOPLANT DESIGN PROJECT 2	4	N	CORE
		61 CBB40403	FORENSIC ANALYTICAL CHEMISTRY	3	Y	ELECTIVE
		62 CBB40503	FORENSIC MOLECULAR BIOLOGY	3	Y	ELECTIVE
		63 CBB40603	BIOINFORMATICS	3	Y	ELECTIVE
		64 CBB40703	FORMULATION OF COSMETICS AND HEALTHCARE PRODUCTS	3	Y	ELECTIVE
		65 CBB40803	COSMETIC AND HEALTHCARE PRODUCT DEVELOPMENT PROCESS	3	Y	ELECTIVE
		66 CBB40903	HALAL COSMETICS AND HEALTHCARE PRODUCTS	3	Y	ELECTIVE
		67 CEB30403	AIR POLLUTION CONTROL TECHNOLOGY	3	Y	ELECTIVE
		68 CEB30503	WASTEWATER TREATMENT TECHNOLOGY	3	Y	ELECTIVE
		69 CJB40303	PHYTOPHARMACEUTICAL TECHNOLOGY	3	Y	ELECTIVE
		70 CPB40303	PROCESS SAFETY MANAGEMENT 2	3	Y	ELECTIVE
		71 CPB40403	PROCESS SAFETY MANAGEMENT 3	3	Y	ELECTIVE
		72 CPB49906	FINAL YEAR PROJECT 2	6	N	FYP
		73 CRB40203	RUBBER ENGINEERING	3	Y	ELECTIVE
	8	74 MPU3212	BAHASA KEBANGSAAN A	2	Y	MPU
		75 MPU3242	INNOVATION MANAGEMENT	2	N	MPU
		76 WIB41012	INDUSTRIAL TRAINING	12	N	INTRA



**SUMMARY TOTAL NUMBER OF SUBJECTS UNDER CATEGORIES :**

CATEGORIES	TOTAL
MPU	17
FYP	2
ELECTIVE	20
UCS(L)	4
UCS	3
CORE	30
INTRA	1

**Total Credit to Graduate (TCG): 140 Credit Hours**

# 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
4. Perform purification process with appropriate equipment and techniques.

### **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

**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.
4. Perform the common unit operation involved in bioseparation to solve problems using data from relevant source

**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:

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.

### **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. Infer principle of bioprocess engineering technology.
2. Generalized bioprocess reaction kinetics.
3. Perform bioprocess reaction activity / downstream processing including elements in separation and purification process.
4. Demonstrate ability to work in team either as a leader or ordinary member.

### **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 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 FOOD**

## **1. Program Structure**

## **2. Major Courses**

- *subject to amendments*

# PROGRAM STRUCTURE

INSTITUTE		UNIVERSITI KUALA LUMPUR KAMPUS CWGN MALAYSIAN INSTITUTE OF CHEMICAL AND BIOENGINEERING TECHNOLOGY				
PROGRAMME		BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (FOOD) WITH HONOURS				
Intake From Semester		2022/20;		Until Sem 2025/2026-3		
Total Credits to Graduate (TCG)		No. of Semester		8		
				Elective Credits		
				9		
YEAR	SEM NO.	NEW CODE	NAME	CREDIT	CHOICE	CATEGORY
1	1	1 CLB10903	ENGINEERING DRAWING & COMPUTING	3	N	CORE
		2 CLB19203	MATHEMATICS 1	3	N	CORE
		3 CLB40002	ENGINEERING TECHNOLOGIST IN SOCIETY	2	N	CORE
		4 MPU3142	BAHASA MELAYU KOMUNIKASI 2	2	Y	MPU
		5 MPU3182	PENGHAYATAN ETIKA DAN PERADABAN	2	Y	MPU
		6 MPU3192	PHILOSOPHY AND CURRENT ISSUES	2	N	MPU
		7 WAD10101	ARABIC 1	1	Y	UCS(L)
		8 WEB10302	FUNDAMENTAL ENGLISH	2	N	UCS
		9 WMD10101	MANDARIN 1	1	N	UCS(L)
	2	10 CLB10703	PHYSICAL CHEMISTRY	3	N	CORE
		11 CLB10904	CHEMICAL PROCESS PRINCIPLES	4	N	CORE
		12 CLB11003	FLUID MECHANICS	3	N	CORE
		13 CLB19303	MATHEMATICS 2	3	N	CORE
		14 CLB21403	ENGINEERING DESIGN	3	N	CORE
		15 WAD10201	ARABIC 2	1	Y	UCS(L)
		16 WEB20202	PROFESSIONAL ENGLISH 1	2	N	UCS
		17 WMD10201	MANDARIN 2	1	N	UCS(L)
2	3	18 CEB20003	INTRODUCTION TO ENVIRONMENTAL ENGINEERING	3	N	CORE
		19 CLB10402	FUNDAMENTALS OF ELECTRICAL & ELECTRONICS	2	N	CORE
		20 CLB10803	ANALYTICAL & ORGANIC CHEMISTRY	3	N	CORE
		21 CLB20403	THERMODYNAMICS	3	N	CORE
		22 CLB21204	TRANSPORT PROCESS PRINCIPLES	4	N	CORE
		23 MPU3332	ISU-ISU KONTEMPORARI MUSLIM DI MALAYSIA	2	Y	MPU
		24 MPU3342	CULTURE AND LIFESTYLE IN MALAYSIA 2	2	Y	MPU
	4	25 CFB20002	INTRODUCTION TO FOOD SCIENCE AND TECHNOLOGY	2	N	CORE
		26 CFB20303	FOOD MICROBIOLOGY	3	N	CORE
		27 CFB20703	FOOD CHEMISTRY	3	N	CORE
		28 CFB31203	CHEMICAL FOOD ANALYSIS	3	N	CORE
		29 CKB30103	INDUSTRIAL SAFETY & HEALTH	3	N	CORE
		30 MPU34102	INTEGRITI & ANTI-RASUAH 2	2	Y	MPU
		31 MPU3412	CAREER GUIDANCE 2	2	Y	MPU
		32 MPU3422	COMMUNITY SERVICE 2	2	Y	MPU
		33 MPU3432	CULTURE 2	2	Y	MPU
		34 MPU3442	RAKAN MASJID 2	2	Y	MPU
		35 MPU3452	SISWA SISWI BOMBA DAN PENYELAMAT 2	2	Y	MPU
		36 MPU3462	KOR SISWA SISWI PERTAHANAN AWAM 2	2	Y	MPU
		37 MPU3472	SPORTS MANAGEMENT 2	2	Y	MPU
		38 MPU3482	PERSONAL FINANCIAL MANAGEMENT 2	2	Y	MPU
		39 MPU3492	ASKAR WATANIAH	2	Y	MPU
		40 WEB20302	PROFESSIONAL ENGLISH 2	2	N	UCS
3	5	41 CFB30103	FOOD SENSORY AND EVALUATION	3	N	CORE
		42 CFB30104	FOOD PROCESSING AND INNOVATION	4	N	CORE
		43 CFB30203	FOOD PACKAGING TECHNOLOGY	3	N	CORE
		44 CFB40503	INSTRUMENTAL FOOD ANALYSIS	3	N	CORE
		45 CLB21303	PROCESS INSTRUMENTATION & CONTROL	3	N	CORE
		46 WBB20103	TECHNOPRENEURSHIP	3	N	CORE
	6	47 CFB31003	FOOD QUALITY & SAFETY MANAGEMENT SYSTEM	3	N	CORE
		48 CFB31103	FOOD PROCESS ENGINEERING	3	N	CORE
		49 CFB31303	HAZARD ANALYSIS CRITICAL CONTROL POINT	3	Y	ELECTIVE
		50 CJB40403	MANAGEMENT FOR CHEMICAL ENGINEERING TECHNOLOGISTS	3	Y	ELECTIVE
		51 CLB20903	ENGINEERING STATISTICS	3	N	CORE
		52 CPB30303	OIL & FAT PROCESS TECHNOLOGY	3	N	CORE
		53 CPB40203	PROCESS SAFETY MANAGEMENT 1	3	Y	ELECTIVE
		54 CPB49804	FINAL YEAR PROJECT 1	4	N	FYP
4	7	55 CBB30703	ENZYME TECHNOLOGY	3	Y	ELECTIVE
		56 CBB40403	FORENSIC ANALYTICAL CHEMISTRY	3	Y	ELECTIVE
		57 CBB40503	FORENSIC MOLECULAR BIOLOGY	3	Y	ELECTIVE
		58 CBB40603	BIOINFORMATICS	3	Y	ELECTIVE
		59 CBB40703	FORMULATION OF COSMETICS AND HEALTHCARE PRODUCTS	3	Y	ELECTIVE
		60 CBB40803	COSMETIC AND HEALTHCARE PRODUCT DEVELOPMENT	3	Y	ELECTIVE
		61 CBB40903	HALAL COSMETICS AND HEALTHCARE PRODUCTS	3	Y	ELECTIVE
		62 CEB30203	ENVIRONMENTAL IMPACT ASSESSMENT	3	Y	ELECTIVE
		63 CEB30403	AIR POLLUTION CONTROL TECHNOLOGY	3	Y	ELECTIVE
		64 CEB30503	WASTEWATER TREATMENT TECHNOLOGY	3	Y	ELECTIVE
		65 CFB30803	HALAL TECHNOLOGY	3	N	CORE
		66 CFB40104	FOOD PLANT DESIGN	4	N	CORE
		67 CJB40303	PHYTOPHARMACEUTICAL TECHNOLOGY	3	Y	ELECTIVE
		68 CJB40503	MARKETING FOR CHEMICAL TECHNOLOGISTS	3	Y	ELECTIVE
		69 CJB40803	CHEMICAL ENGINEERING TECHNOLOGIST ORGANIZATION	3	Y	ELECTIVE
		70 CPB40303	PROCESS SAFETY MANAGEMENT 2	3	Y	ELECTIVE
		71 CPB40403	PROCESS SAFETY MANAGEMENT 3	3	Y	ELECTIVE
		72 CPB49906	FINAL YEAR PROJECT 2	6	N	FYP
	8	73 CRB40203	RUBBER ENGINEERING	3	Y	ELECTIVE
		74 CRB40503	BIO-POLYMER	3	Y	ELECTIVE
		75 MPU3212	BAHASA KEBANGSAAN A	2	Y	MPU
		76 MPU3242	INNOVATION MANAGEMENT	2	N	MPU
		77 WIB41012	INDUSTRIAL TRAINING	12	N	INTRA

**SUMMARY TOTAL NUMBER OF SUBJECTS UNDER CATEGORIES :**

<b>CATEGORIES</b>	<b>TOTAL</b>
MPU	17
FYP	2
ELECTIVE	20
UCS(L)	4
UCS	3
CORE	30
INTRA	1

**Total Credit to Graduate (TCG): 140 Credit Hours**

# 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 general principles and concepts in food science and technology.
2. Participate in class discussions on selected topics of food science and technology.
3. Collaborate with team members in planning and discussing the related issues of food science and technology.

### **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 analyzed 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, mineral, 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, mineral, pigments and other food additives.
2. Perform laboratory experiment related to food chemistry and biochemistry.
3. Organize problem given in a form of mini project leading to 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**

**CJB40303 Management for Chemical Engineering Technology**  
**CBB40403 Forensic Analytical Chemistry**  
**CBB40503 Forensic Molecular Biology**  
**CBB40603 Bioinformatics**  
**CBB40703 Formulation of Cosmetic and Healthcare Products**  
**CBB40803 Cosmetic and Healthcare Product Development**  
**Process**  
**CBB40903 Halal Cosmetics and Healthcare Products**  
**CBB30703 Enzyme Technology**  
**CJB40303 Phytopharmaceutical Technology**  
**CEB30403 Air Pollution Control Technology**  
**CEB30503 Wastewater Treatment Technology**  
**CFB31303 Hazard Analysis Critical Control Point**  
**CPB40203 Process Safety Management 1**  
**CPB40303 Process Safety Management 2**  
**CPB40403 Process Safety Management 3**  
  
**CEB30203 Environmental Impact Assessment**  
  
**CJB40503 Marketing for Chemical Engineering Technologist**  
**CJB40803 Chemical Engineering Technologist Organizational**  
**Behaviour**  
  
**CRB40203 Rubber Engineering**  
**CRB40503 Bio-Polymer**

**CJB40303 Management for Chemical Engineering Technology****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.

**CBB40403 Forensic Analytical Chemistry****Rationale for inclusion of the course in the program:**

The course focuses on the examination and chemical analysis of physical evidence related to the investigation of criminal matters. Examination is placed on the chemistry and composition of a range of physical evidences, including textile fiber, glass, paint, illicit drugs, fire debris and explosive residues. The separation and identification techniques are also emphasized in relation to the analysis of forensic samples.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Apply important analytical techniques and tools used in forensic science.
2. Demonstrate practical skills in analytical chemistry to solve a specific problem related to forensic science.
3. Present judiciary forensic analysis evidence verbally and in writing

**CBB40503 Forensic Molecular Biology****Rationale for inclusion of the course in the program:**

The purpose of this course is to acquaint the student with the history of forensic biological testing and current methods applicable in forensic science. Emphasis will be placed on PCR technology and STR fragment analysis. The meaning of DNA profile matches utilizing population statistics based on population genetics will also be introduced.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Justify/Explain forensic biological techniques.
2. Perform forensic biology laboratory procedures.
3. Prepare proper documentation and handling of physical evidence containing biological evidence.

**CBB40603 Bioinformatics****Rationale for inclusion of the course in the program:**

This course covers the bioinformatics skills used in forensics science and biotechnology laboratories for analyzing individual DNA and protein sequences. The focus is extensive hands-on experience using mainstream web-based bioinformatics tools.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Discuss the fundamental and advance knowledge in bioinformatics.
2. Perform bioinformatics analysis to solve problems related to forensic science.
3. Organize the analysis used in in bioinformatics to solve specific problem in forensics science verbally and in writing.

**CBB40703 Formulation of Cosmetic and Healthcare Products****Rationale for inclusion of the course in the program:**

This course covers the principles of cosmetics and healthcare products formulation including origin of ingredients, its authentication, description and formulation. It is designed to provide knowledge to students on the selection of ingredients and its function and finished product dosage forms. Finally the students will be able to formulate their own products based on the knowledge.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Determine the cosmetic and healthcare product formulations and dosage forms based on the chemical and physical properties of the active compounds and other ingredients.
2. Perform analytical and experimental skills to come out with formulation of cosmetics and healthcare products.
3. Formulate the product formulation and dosage form that meets the requirements by the authority body.



**CBB40803 Cosmetic and Healthcare Product Development Process****Rationale for inclusion of the course in the program:**

This course encompasses on the principle involved in developing cosmetic and healthcare products and on the standards and regulations given by the regulatory and authorised body.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Discuss the development of cosmetic and healthcare products that fulfill the quality and regulatory requirements.
2. Perform experimental procedures related to cosmetic and healthcare product development and its relevant analysis.
3. Explains the technology used in developing cosmetics/healthcare product through effective report writing and presentation.

**CBB40903 Halal Cosmetics and Healthcare Products****Rationale for inclusion of the course in the program:**

This course covers all aspects of halal cosmetics and healthcare products including origin of ingredients, its authentication, description, analysis, formulation and production. It is designed to enhance knowledge of students on the implementation of halal assurance system (HAS) and audit. This course will cover in depth review of HAS and audit as a method to overcome hazards and establish a control system to ensure integrity and safety on the production for halal products.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Evaluate knowledge and understanding on halal cosmetics and healthcare products.
2. Perform halal internal auditing programme within the organization.
3. Prepare Halal Assurance System (HAS) for cosmetics and healthcare products' operation.

**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.

**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.

**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. Characterize 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. Describe the current issues in air pollution and perform air quality monitoring and evaluate the results based on sound 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 Wastewater 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. Distinguish the primary and secondary standards for treated wastewater effluent towards compliance discharge standards.
2. Perform different physiochemical and biological wastewater treatment processes.
3. Select and apply appropriate techniques to design a complete wastewater treatment plant
4. Communicate effectively through the preparation of reports and technical papers.

**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)

**CPB40203 Process Safety Management 1****Rationale for inclusion of the course in the program:**

This subject will introduce the Process safety management as issued by Occupational Safety and Health Administration, US [OSHA]. It will also discuss and relate it to various element of safety management system and local statutory.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Identify the process safety elements, safety management system with legislation in industries
2. Evaluate safe work practices, operation procedures, contractor management and emergency planning in various workplaces.
3. Describe process safety management [PSM] elements in process industries

**CPB40303 Process Safety Management 2****Rationale for inclusion of the course in the program:**

This course will discuss critical elements of Process safety standard. The elements are the preventive (proactive) identification, evaluation and mitigation or prevention of various hazardous releases that could occur as a result of failures in processes, procedures, or equipment.

**Learning Outcomes:**

Upon completion of this course students should be able to:

1. Identify the process safety culture and various safety information in the management of safety at workplace.
2. Evaluate asset integrity and reliability, initial safety review and Management of Change in industries.

3. Explain the appropriate process hazard analysis tools in managing the risk.

### **CPB40403 Process Safety Management 3**

#### **Rationale for inclusion of the course in the program:**

This course is will discuss on applying the PHA tools in various process industries and carrying audit process of PSM elements against standards or legislation issued by Occupational Safety and Health Administration, US and local statutory.

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

1. Investigate the incident and causation theories in various process industries accident.
2. Evaluate the various PSM elements in the audit process.
3. Explain the process hazard analysis tools used in the process industries.

### **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.

### **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	<b>Engineering Knowledge:</b> Apply knowledge of mathematics, science, engineering fundamentals and chemical engineering to the solution of complex chemical engineering problems.
PLO2	<b>Problem Analysis:</b> Identify, formulate, research literature and analyse complex chemical engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PLO3	<b>Design/ Development of Solutions:</b> 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	<b>Investigation:</b> 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	<b>Modern Tool Usage:</b> 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	<b>The Engineer and Society:</b> 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	<b>Environment and Sustainability:</b> Evaluate the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
PLO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PLO9	<b>Communication:</b> 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	<b>Individual and Team Work:</b> Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PLO11	<b>Life Long Learning:</b> 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	<b>Project Management and Finance:</b> 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	<b>Mathematics for Engineers 1</b>			Semester	1
Course Code	<b>CCB10003</b>			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. 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	<b>Analytical and Organic Chemistry</b>			Semester	2
Course Code	<b>CCB 10103</b>			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:  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	<b>Engineering Practice and Professionalism</b>			Semester	2
Course Code	<b>CCB 10201</b>			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:  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	<b>Physical Chemistry</b>			Semester	2
Course Code	<b>CCB 10303</b>			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"> <li>1. Explain the basic concepts of physical chemistry. (C2)</li> <li>2. Apply the principles of physical chemistry to solve chemical engineering problems. (C3)</li> <li>3. Analyze the principles of properties of gases, thermodynamics, equilibrium and chemical kinetics to solve chemical engineering problems. (C4)</li> </ol>			
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	<b>Chemical Engineering Laboratory 1</b>		Semester	2
Course Code	<b>CCB 10402</b>		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: <ol style="list-style-type: none"> <li>1. Execute standard operating procedure for laboratory experiments. (C3)</li> <li>2. Apply the knowledge acquired in previous mathematics, science and chemical engineering courses to analyze and interpret information acquired by operating process equipment. (C3)</li> <li>3. Analyze the experimental data obtained from the conducted experiments. (C4)</li> <li>4. Produce and present laboratory reports formatively. (P4)</li> </ol>			
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	<b>Fluid Mechanics</b>		Semester	2
Course Code	<b>CCB 10603</b>		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"> <li>1. Explain the properties and behaviour of fluids in both static and motion conditions. (C2)</li> <li>2. Apply the principles of fluid mechanics in engineering application. (C3)</li> <li>3. Analyse the engineering problems associated with fluid systems. (C4)</li> </ol>			
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	<b>Material Balance</b>		Semester	2
Course Code	<b>CCB 10702</b>		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"> <li>1. Determine the dimension of an equation and conversion of units. (C4)</li> <li>2. Analyze the material balance of process streams, stream components and phase systems based on chemical process principles. (C4)</li> <li>3. Apply computer software in solving material balance calculations. (C3)</li> </ol>			
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	<b>Mathematics for Engineers 2</b>		Semester	2
Course Code	<b>CCB 11003</b>		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"> <li>1. Solve ordinary differential equations and partial differential equations' problems. (C3)</li> <li>2. Apply Laplace transforms to solve differential equations problems. (C3)</li> <li>3. Determine Fourier series of given functions. (C4)</li> </ol>			
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	<b>Computer Programming for Engineers</b>		Semester	3
Course Code	<b>CCB 20003</b>		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"> <li>1. Demonstrate the use of control structures (sequential, selection and iteration) in C++ language and MATLAB. (C3)</li> <li>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)</li> <li>3. Apply appropriate compiler and debugger tools to compile and debug program. (C3)</li> </ol>			
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	<b>Introduction to Biochemical Engineering</b>		Semester	3
Course Code	<b>CCB 20102</b>		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	<b>Fundamentals of Electrical and Electronics Engineering</b>			Semester	3
Course Code	<b>CCB 21102</b>			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>5. Describe basic concept of electricity, circuit theorems, electrical and electronics system, and electrical machines. (C2)</p> <p>6. Apply fundamental principles of electrical and electronics to solve engineering problems. (C3)</p>
Synopsis	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.

#### **SEMESTER 4**

Course Title	<b>Mass Transfer</b>	Semester	4
Course Code	<b>CCB 20202</b>	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> <ol style="list-style-type: none"> <li>1. Distinguish the principle of diffusion in steady state, unsteady state and convective mass transfer. (C4)</li> <li>2. Evaluate diffusion coefficients in gas mixtures, liquid mixtures, electrolytes, biological solutes in liquid and solid. (C5)</li> <li>3. Analyze mass transfer in turbulent and laminar flows. (C4)</li> <li>4. Examine problems involving diffusion and mass transfer. (C4)</li> </ol>		
Synopsis	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.		

Course Title	<b>Process Heat Transfer</b>	Semester	4
Course Code	<b>CCB 20303</b>	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> <ol style="list-style-type: none"> <li>1. Justify the concepts and laws related to heat transfer process. (C5)</li> <li>2. Apply empirical correlations for heat transfer and determine the amount of heat transfer rates. (C3)</li> <li>3. Examine engineering problems related to heat transfer. (C4)</li> </ol>		
Synopsis	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.		

Course Title	<b>Reaction Engineering 1</b>	Semester	4
Course Code	<b>CCB 20602</b>	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> <ol style="list-style-type: none"> <li>1. Solve problems for batch and flow reactors based on fundamentals of reaction engineering. (C4)</li> </ol>		

	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 different 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 mass 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:  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:  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:  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	<b>Particle Technology</b>			Semester	6
Course Code	<b>CCB 31302</b>			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"> <li>1. Distinguish the methods used in particle size measurement and phenomenon involving slurry transport and colloids and fine particles. (C4)</li> <li>2. Analyze for the problems involving separation and transport of particle in fluids (C4)</li> <li>3. Determine the health effects of fine powders. (C4)</li> </ol>				
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	<b>Process Analysis and Simulation</b>			Semester	6
Course Code	<b>CCB 31502</b>			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"> <li>1. Apply knowledge of process analysis and simulation to the solution of chemical engineering problems. (C3)</li> <li>2. Analyze the performance of chemical processes using principles of simulation. (C4)</li> <li>3. Select the appropriate computer software for the analysis and simulation of various chemical processes. (C5)</li> </ol>				
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	<b>Industrial Training</b>			Semester	6 – 7
Course Code	<b>CCB 49705</b>			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"> <li>1. Demonstrate the ability to work professionally with consideration on safety and health during the training. (C3)</li> <li>2. Apply engineering knowledge in performing assigned task during the Industrial Training. (C3)</li> </ol>				

	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	<b>Plant Design and Management System</b>		Semester	7
Course Code	<b>CCB 40003</b>		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"> <li>1. Apply knowledge and tools of engineering and management system in chemical process plant. (C3)</li> <li>2. Examine plant drawings and specification in the design of chemical plant. (C4)</li> <li>3. Construct 3-Dimensional plant model for chemical engineering processes. (C6)</li> </ol>			
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	<b>Design Project 1</b>		Semester	7
Course Code	<b>CCB 40103</b>		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: <ol style="list-style-type: none"> <li>1. Develop preliminary design of a chemical plant based on fundamentals and concepts in chemical engineering. (C6)</li> <li>2. Practice of ethical consequences in design aspect and ethical behaviour in line with professional code of conduct requirement. (A5)</li> <li>3. Evaluate the feasibility on technical and economic of a chemical plant. (C5)</li> <li>4. Perform cost estimation of a chemical plant. (C4)</li> <li>5. Produce and present reports for the plant design. (P4)</li> <li>6. Develop 2D and 3D engineering drawings of a chemical plant. (C6)</li> <li>7. Demonstrate team work skills to complete an assigned task with responsibility. (A3)</li> </ol>			
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	<b>Renewable and Sustainable Energy Engineering</b>		Semester	7
Course Code	<b>CCB 40203</b>		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"> <li>1. Identify the conventional energy problems and various types of renewable energy sources. (C3)</li> <li>2. Analyse the potential of renewable energy technologies in different contexts for sustainable development. (C4)</li> <li>3. Perform the preliminary of heat integration design in a chemical processing plant (C4)</li> <li>4. Optimize the process performance based on pinch analysis. (C5).</li> </ol>			



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	<b>Management and Marketing for Chemical Engineers</b>	Semester	7
Course Code	<b>CCB 40402</b>	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"> <li>1. Explain the elements and principles of marketing relative to chemical engineering project and chemical commodities (C2)</li> <li>2. Evaluate the concept and principles of management in identifying bottlenecks and restructuring the operation related to chemical industry. (C5)</li> <li>3. Relate the interactions between the environment, technology and organizations in order to achieve high performance. (P4)</li> </ol>		
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	<b>Engineers in Society</b>	Semester	7
Course Code	<b>CCB 40602</b>	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"> <li>5. Identify ethical and professionalism issues in engineering. (A4)</li> <li>6. Evaluate the decisions related to contemporary issues from an engineering standpoint. (C4)</li> <li>7. Demonstrate the knowledge and the ability to engage in independent lifelong learning. (C4)</li> </ol>		
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	<b>Engineering Final Year Project 1</b>	Semester	7
Course Code	<b>CCB 49802</b>	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"> <li>1. Demonstrate the abilities to plan and work effectively. (C3)</li> <li>2. Analyse the research gap using the fundamental engineering theory. (C4)</li> <li>3. Perform critical review of the research project. (C4)</li> <li>4. Propose a specific research methodology to solve the research problem. (C5)</li> </ol>		

	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	<b>Design Project 2</b>		Semester	8
Course Code	<b>CCB 40304</b>		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: <ol style="list-style-type: none"> <li>1. Design a chemical engineering related plant. (C6)</li> <li>2. Perform equipment design for a chemical plant. (C4)</li> <li>3. Evaluate engineering economic analysis of a chemical plant. (C5)</li> <li>4. Optimize chemical processes for the plant design. (C4)</li> <li>5. Demonstrate knowledge and understanding of safety in chemical plant design. (C3)</li> <li>6. Produce and present reports for the plant design. (P4)</li> <li>7. Demonstrate team work skills to complete an assigned task with responsibility. (A3)</li> </ol>			
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	<b>Engineering Final Year Project 2</b>		Semester	8
Course Code	<b>CCB 49904</b>		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: <ol style="list-style-type: none"> <li>1. Analyse complex engineering problem using the fundamental engineering theory. (C4)</li> <li>2. Manage the project to solve complex engineering problem. (C5)</li> <li>3. Evaluate the impact of engineering parameters to determine the behavior of the system or equipment and to draw essential engineering findings. (C5)</li> <li>4. Apply the project using appropriate techniques and tools. (C3)</li> <li>5. Perform independent critical review and embed conclusion with recommendation for the research findings. (C4)</li> <li>6. Produce a project report according to the specified standard format. (P4)</li> <li>7. Present and defend the project effectively. (P4)</li> </ol>			
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	<b>Plant Utilities and Maintenance</b>		Semester	7
Course Code	<b>CCB 40502</b>		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	<b>Petrochemicals and Petroleum Refining Technology</b>	Semester	8
Course Code	<b>CCB 41302</b>	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	<b>Quality Assurance and Quality Control in Chemical Engineering</b>	Semester	8
Course Code	<b>CCB 41402</b>	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	<b>Solid and Hazardous Waste Management</b>	Semester	7
Course Code	<b>CCB 40702</b>	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	<b>Air Pollution Control</b>	Semester	8
Course Code	<b>CCB 40802</b>	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	<b>Wastewater Treatment Engineering</b>	Semester	8
Course Code	<b>CCB 40902</b>	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.		

# BACHELOR OF FOOD SAFETY AND QUALITY TECHNOLOGY

# Bachelor of Food Safety and Quality Technology

## PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1	UniKL graduates who are knowledgeable, competent and innovative, which will contribute towards the requirement of human capital in food safety and quality.
PEO2	UniKL graduates who are effective leaders with teamwork skills, as well as verbal and non-verbal interpersonal communication skills to support their role in industry.
PEO3	UniKL graduates who are committed towards the importance of lifelong learning and continuous improvement..
PEO4	UniKL graduates who are professional, ethical and socially responsible.
PEO5	UniKL graduates who are capable of embarking on business and technopreneurial activities.

## PROGRAMME LEARNING OUTCOMES (PLO)

PLO1	<b>Knowledge:</b> Apply the knowledge of technology fundamental to broadly-defined procedures, processes, systems and methodologies in food safety and quality
PLO2	<b>Practical Skills and High Technology:</b> Propose and employ current tools and techniques to resolve broadly-defined problems.
PLO3	<b>Analytical, Critical Thinking and Scientific Approach:</b> Demonstrate deep investigation and significant thinking abilities to solve broadly defined problems in the field of food safety and quality.
PLO4	<b>Communication Skills:</b> Communicate effectively and flexibly in oral and written language for social, academic and professional purposes.
PLO5	<b>Social and Responsibility in Society and Technologist Community:</b> Illustrate the understanding of corresponding issues related to the society and the subsequent responsibilities to the broadly-defined food safety and quality technology practices..
PLO6	<b>Lifelong learning and information management:</b> Acknowledge the requirement of professional establishment and to employ independent continuing learning in food safety and quality specialist technologists.
PLO7	<b>Technopreneurship and Management Skills:</b> Illustrate consciousness of management and tecnopreneurship routine in real perspective
PLO8	<b>Ethics and Professionalism:</b> Illustrate ethical awareness and professionalism.
PLO9	<b>Teamwork and Leadership:</b> Illustrate leadership character, mentoring and work efficiently in diverse teams

# PROGRAMME STRUCTURE

<b>INSTITUTE</b>		UNIVERSITI KUALA LUMPUR KAMPUS CWGN MALAYSIAN INSTITUTE OF CHEMICAL AND BIOENGINEERING TECHNOLOGY		
<b>PROGRAMME</b>		BACHELOR OF FOOD SAFETY AND QUALITY TECHNOLOGY		
<b>Intake From Semester</b>		2021/2022-1	<b>Until Sem</b> 2022/2023-1	
<b>Total Credits to Graduate (TCG)</b>		120	<b>No. of Semester</b> 6	
YEAR	SEM NO.	CODE	NAME	CREDIT
1	1	1	CQB10103 ENGLISH FOR TECHNOLOGIST	3
		2	CQB10203 INTRODUCTION TO FOOD SAFETY AND QUALITY TECHNOLOGY	3
		3	CQB10803 ANALYTICAL AND ORGANIC CHEMISTRY	3
		4	CQB19203 MATHEMATICS 1	3
		5	MPU3113 HUBUNGAN ETNIK	3
		6	MPU3123 TAMADUN ISLAM & TAMADUN ASIA (TITAS)	3
		7	MPU3143 BAHASA MELAYU KOMUNIKASI 2	3
		8	MPU3173 PENGAJIAN MALAYSIA 3	3
		9	MPU3333 ISU-ISU KONTEMPORARI MUSLIM DI MALAYSIA	3
		10	MPU3343 CULTURE AND LIFESTYLE IN MALAYSIA 2	3
	2	11	CQB10303 FOOD PRODUCT MANUFACTURING	3
		12	CQB10403 GLOBAL FOOD SECURITY	3
		13	CQB10503 MICROBIOLOGICAL FOOD SAFETY	3
		14	CQB10603 FOOD ANALYSIS AND SENSORY EVALUATION	3
		15	CQB10703 ENGINEERING STATISTIC	3
		16	CQB10903 INDUSTRIAL SAFETY & HEALTH	3
		17	MPU3242 INNOVATION MANAGEMENT	2
2	3	18	CQB20103 FOOD SAFETY AND PACKAGING TECHNOLOGY	3
		19	CQB20203 FOOD SAFETY AND LEGISLATION	3
		20	CQB20303 SUPPLY CHAIN MANAGEMENT SYSTEM	3
		21	CQB20403 FOOD INGREDIENTS	3
		22	CQB20503 HALAL MANAGEMENT SYSTEM	3
		23	CQB21103 PROCESS INSTRUMENTATION & CONTROL	3
		24	MPU34102 INTEGRITI & ANTI-RASUAH 2	2
		25	MPU3412 CAREER GUIDANCE 2	2
		26	MPU3422 COMMUNITY SERVICE 2	2
		27	MPU3432 CULTURE 2	2
		28	MPU3442 RAKAN MASJID 2	2
		29	MPU3452 SISWA SISWI BOMBA DAN PENYELAMAT 2	2
		30	MPU3462 KOR SISWA SISWI PERTAHANAN AWAM 2	2
		31	MPU3472 SPORTS MANAGEMENT 2	2
		32	MPU3482 PERSONAL FINANCIAL MANAGEMENT 2	2
		33	MPU3492 ASKAR WATANIAH	2
	4	34	CQB20603 FOOD SAFETY TOXICOLOGY	3
		35	CQB20703 HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP)	3
		36	CQB20804 FOOD QUALITY AND STANDARD	4
		37	CQB20903 FOOD PRODUCT DESIGN AND DEVELOPMENT	3
		38	CQB21003 FOOD WASTE MANAGEMENT SYSTEM	3
2	4	39	WBB20103 TECHNOPRENEURSHIP	3
3	5	40	CQB30110 APPLIED FOOD PRODUCT MANUFACTURING	10
		41	CQB39810 INDUSTRIAL FINAL YEAR PROJECT	10
	6	42	CQB30206 APPLIED FOOD QUALITY AND STANDARD	6
		43	CQB30306 APPLIED HALAL MANAGEMENT SYSTEM	6
		44	CQB30406 APPLIED FOOD PRODUCT DESIGN AND DEVELOPMENT	6
		45	CQB30506 APPLIED FOOD SAFETY AND LEGISLATION	6
		46	CQB30606 APPLIED SUPPLY CHAIN MANAGEMENT SYSTEM	6
		47	CQB30706 APPLIED INDUSTRIAL SAFETY AND HEALTH	6
		48	MPU3213 BAHASA KEBANGSAAN A	3
		49	WIB31008 INDUSTRIAL TRAINING	8

## SUMMARY TOTAL NUMBER OF SUBJECTS UNDER CATEGORIES :

CATEGORIES	TOTAL
MPU	18
ELECTIVE	5
UCS	1
CORE	24
INTRA	1

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**  
**MPU 3242 INNOVATION MANAGEMENT**  
**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****Synopsis:**

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 menguruskan 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****Synopsis:**

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:

5. Describe and discuss the diversity of society
6. Explain the importance of Malaysia's identity towards nurturing the spirits of university
7. Build social relationship and interaction among students

**MPU 3123 Tamadun Islam & Tamadun Asia (TITAS)****Synopsis:**

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 sosial dalam kepelbagaian lanskap budaya.
3. Membahaskan elemen ketamadunan dengan isu kemasyarakatan semasa.

### **MPU 3143 Bahasa Melayu Komunikasi 2**

#### **Synopsis:**

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 kandungan 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**

#### **Synopsis:**

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 realiti 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 dan kewajipan beragama demi masa depan masyarakat Islam dalam konteks semasa

### **MPU 3343 Culture And Lifestyle In Malaysia**

#### **Synopsis:**

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:

4. Compare acceptable cultural practices, norms and lifestyle in Malaysia
5. Organize program on cultural values, ethnicity and lifestyle in Malaysia
6. Analyse information on cultural and lifestyle issues

### **MPU3242 Innovation Management**

#### **Synopsis:**

This course is to help students to understand the complex process of innovation which depends on people and their interactions; to stimulate new thinking rather than prescribe some definitive methodology; to understand the issues involved in being an innovator and the culture for supporting innovation; understand the critical issues that organizations need to develop to support innovation; to be able to develop a marketing strategic planning and able to do qualitative and quantitative market analysis; to understand the process of product development and market testing; and to understand commercialization strategy i.e. marketing mix and future plan. These teaching components would benefit the students in becoming future entrepreneurs.

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

6. Explain the importance of innovation in organisation
7. Analyse the different types of innovation, products classes and the impact to the industry.
8. Distinguish the steps in the innovation process
9. Assess the key challenges to innovation.
10. Develop a viable innovative project.

### **MPU 3412 Career Guidance 2**

#### **Synopsis:**

This course is one of the co-curriculum modules offered to develop well-rounded individuals through involvement in social and community activities. Specifically, it enables students to understand the importance of career planning. It also promotes soft skills that can be applied in their future careers. Apart from that, it creates a better understanding about potential employer's expectations in job hunt.

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

5. Identify their personality types towards career & leadership
6. Determine ways in managing stress in the workplace
7. Demonstrate awareness of real work environment and the industry

8. Outline their future career and targets

### **MPU 3422 Community Service 2**

#### **Synopsis:**

This course is one of the co-curriculum modules offered to develop well-rounded individuals through involvement in high impact social and community activities. Specifically, it aims to develop interest among the students to participate in community service programmes. It also enables student to understand the importance of performing community service and the ways to implement the programmes and activities. Besides that, it provides better understanding to the students on the values, ethics and benefits of carrying out community service programmes.

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

5. Organize and participate in large scale/ high impact community service programmes and activities
6. Apply knowledge learnt in course in community service programmes and activities
7. Demonstrate entrepreneurship skills in community service programmes and activities
8. Explain the values, ethics and benefits of participating in community service programmes and activities.

### **MPU 3432 Culture 2**

#### **Synopsis:**

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:

4. Apply knowledge gained in planning and organizing a cultural event
5. Demonstrate appropriate skills in organising a culture event
6. Evaluate the effectiveness of the management of a cultural event.

**MPU3442 Rakan Masjid 2****Synopsis:**

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 give exposure to students on managing mosque effectively and implementing various activities related to the mosque. This is to enable students to play their role in developing the ummah through the mosque.

**Learning Outcomes:**

Upon completion of this course students should be able to:

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

**MPU3452 Siswa Siswi Bomba & Penyelamat 2****Synopsis:**

This course is one of the co-curriculum modules offered to develop well-rounded individuals through involvement in social and community activities. Specifically, it gives exposure on the introduction to Malaysian Fire and Rescue Department, foot marching technique, fire rescue, ascending and descending technique and basic emergency aid.

**Learning Outcomes:**

Upon completion of this course students should be able to:

4. Organize a project (theory and practically about BOMBA activities)
5. Communicate and demonstrate leadership and team skills through BOMBA activities (rescue, fire rescue and first aid)
6. Apply appropriate fundamental knowledge of rescue, fire rescue and first aid.

**MPU3462 Pasukan Siswa-Siswi Pertahanan Awam 2****Synopsis:**

This course is one of the co-curriculum modules offered to develop well-rounded individuals through involvement in social and community activities. Specifically, it gives exposure on the introduction on the instruction to Malaysian Civil Defense Force, foot marching technique, fire rescue, ascending and descending technique and basic emergency aid.

**Learning Outcomes:**

Upon completion of this course students should be able to:

4. Communicate and demonstrate leadership and team skills through BOMBA activities (rescue, fire rescue and first aid).
5. Participate actively in Project (theory and practically about JPAM activities).
6. Apply appropriate fundamental of rescue, fire rescue and first aid.

**CQB10103 English For Technologist**

**WIB31008 Industrial Training**

### **CQB10103 English for Technologist**

#### **Synopsis:**

This course aims to familiarise students to technical vocabulary and language functions used in their field of study. Students also need to utilise proper writing principles and mechanics of technical communication in writing reports. In addition to that, students present their ideas and opinions using appropriate presentation techniques.

#### **Learning Outcomes:**

Upon completion of this course students should be able to:

4. Describe equipment and processes related to their field of study using appropriate language
5. Produce a report with its necessary components i.e. trend analysis & referencing
6. Present information orally

### **WIB31008 Industrial Training**

#### **Synopsis:**

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:

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

## **COMMON CORE**

### **WBB20103 Technopreneurship**



### **WBB20103 Technopreneurship**

#### **Synopsis:**

The module will enhance student's knowledge and skills in business planning, financial management, business operations and marketing. The focus will be on attributes on Technopreneurs, searching for viable opportunities, taking into considerations the trends and new challenges in the business woeld; 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:

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

## **DISCIPLINE CORE**

**CQB10203 Introduction To Food Science And Technology**  
**CQB10803 Analytical and Organic Chemistry**  
**CQB19203 Mathematics 1**  
**CQB10303 Food Product Manufacturing**  
**CQB10503 Microbiological Food Safety**  
**CQB10603 Food Analysis And Sensory Evaluation**  
**CQB10703 Engineering Statistic**  
**CQB10903 Industrial Safety & Health**  
**CQB20103 Food Safety And Packaging Technology**  
**CQB20203 Food Safety And Legislation**  
**CQB20303 Supply Chain Management System**  
**CQB20403 Food Ingredients**  
**CQB20503 Halal Management System**  
**CQB21103 Process Instrumentation & Control**  
**CQB20603 Food Safety Toxicology**  
**CQB20703 Hazard Analysis Critical Control Point (HACCP)**  
**CQB20804 Food Quality And Standard**  
**CQB20903 Food Product Design And Development**  
**CQB21003 Food Waste Management System**  
**CQB30110 Applied Food Product Manufacturing**  
**CQB39810 Industrial Final Year Project**  
**CQB30206 Applied Food Quality And Standard**  
**CQB30306 Applied Halal Management System**  
**CQB30406 Applied Food Product Design And Development**  
**CQB30506 Applied Food Safety And Legislation**  
**CQB30606 Applied Supply Chain Management System**  
**CQB30706 Applied Industrial Safety And Health**

**Synopsis:**

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

**Learning Outcomes:**

1. Discover the science and technology of the nature of food, its processing and preservation technique
2. Discuss on related issue regarding food science and technology
3. Work with team member in planning and performing scientific inquiry

**CQB10303 Food Product Manufacturing****Synopsis:**

This course will provide students with the theoretical and practical aspects of food product manufacturing. This syllabus covers manufacturing of selected food commodities and the quality control of the finished products. Students also require to identify and providing solution in certain aspects of problems related to food manufacturing processes while adopting the Internet of Thing (IoT) and entrepreneurial elements.

**Learning Outcomes:**

1. Identify theoretical aspect of food product manufacturing
2. Apply quality control in the food product manufacturing processes
3. Solve with team member in certain aspects of problems related to food product manufacturing processes

**CQB10503 Microbiological Food Safety****Synopsis:**

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:**

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 analyzed results of analysis in food microbiology.
3. Collaborate with team members in planning and performing a scientific inquiry.

**CQB10603 Food Analysis And Sensory Evaluation****Synopsis:**

This course will provide the principles of chemical and instrumental analysis of food and sensory evaluation. The course will cover the application of quantitative and qualitative analysis used in the physical, chemical and instrumental examination of food products. A special emphasis is placed on the evaluation of methods and interpretation of results. An overview of the physiological and psychological foundations of sensory functions, methods for sensory testing and fundamentals application of statistical approach for data analysis will be part of this course.

**Learning Outcomes:**

1. Apply the appropriate principles and procedures for food analysis and sensory evaluation.

2. Conduct experiment using appropriate food analysis and sensory evaluation approach to guide product development and assure quality of food.
3. Discuss with team members in planning, performing and reporting a scientific inquiry/assignment related to food analysis and sensory.

### **CQB10903 Industrial Safety & Health**

#### **Synopsis:**

This course discusses the occupational safety, control method (to develop and implement appropriate control techniques for personal and workplace safety), chemical safety, health concept, biohazard level and control.

#### **Learning Outcomes:**

1. Perform analyses of risk related to occupational safety and health and comparing with statutory laws.
2. Analyze types of hazard related to workplace, appropriate control measures and risks associated with it.
3. Explain safety and health issues at workplace by comparing to Malaysian laws and regulations.

### **CQB20103 Food Safety And Packaging Technology**

#### **Synopsis:**

To provide students with the principles and application of packaging materials in food industry as well as packaging regulation and labelling requirement in line with Malaysia and International Standard. In order to prepare our students to meet the changing demands of the industry especially food packaging industry, Additive Manufacturing elements is incorporate in the course through mini project.

#### **Learning Outcomes:**

1. Explain the functions of packaging and differentiate the material properties of various packaging raw materials as well as the final package in food industry.
2. Demonstrate the appropriate techniques and methods for some types of food packaging materials.
3. Create innovative food packaging prototype by adopting additive manufacturing and entrepreneurship element in compliance with Malaysian Food Act and International Standard.
4. Report with team members regarding current issues in food packaging industry.

### **CQB20203 Food Safety And Legislation**

#### **Synopsis:**

This course covers the principles related to food laws, standard and legislation, food safety and management system, hazard risk in food ingredients, self inspection system and enforcement that is widely used and endorsed in Malaysia and internationally by industry, regulatory and consumer groups.

#### **Learning Outcomes:**

1. Identify the risks of food hazards by outline the laws regarding the use of ingredients and additives required for the production of a product.
2. Evaluating the responsibilities of employers and employees have according to current food safety legislation which relates to food premises.
3. Collaborate with team members in planning, performing and reporting a scientific inquiry related to food safety and legislation.

**CQB20303 Supply Chain Management System****Synopsis:**

This course covers various aspects of food supply chains in detail; to cover food supply chain from farm to fork, taking into consideration the various challenges and supporting mechanisms to make sure that the food reaching the plates is safe. It will also look into the technology and current practices in the food industry to ensure the movement of materials meeting required specification.

**Learning Outcomes:**

1. Classify the function of different entities in the food supply chain network.
2. Solving the operational challenges that are relevant for the efficient movement of the supply chain network.
3. Organise report with team members regarding issues in food supply chain management system.

**CQB20403 Food Ingredients****Synopsis:**

The course will present principles and utilization of food ingredients. The regulations and practice, differences in additive usage in other countries. The students will be exposed to various aspects of food ingredients, the properties of food with emphasis on the chemical basis of the food quality attributes of flavor, texture, color, nutrition, and chemical safety. Flavour, colour and food additives are important aspects of food processing from consumer acceptability point of view. Standards have been laid down for type and concentration of food additives.

**Learning Outcomes:**

1. Outline the ingredient and additives commonly found in food and explain the advantages and disadvantages of these additives.
2. Evaluate the contributions and the limitations of food ingredient and food additives in our food supply.
3. Discuss with team members in planning, performing and reporting a scientific inquiry/ assignment related to food analysis.

**CQB20503 Halal Management System****Synopsis:**

The course will present principles and application of halalan toyyiban food concept in Syarie, halal and haram food source, slaughtering technique, food chain, halal food processing concept, ingredient and halal food additive, halal and quality system, hygiene and food sanitation, JAKIM certification procedure, Malaysian Standards related to Halal eg. MS1500:2009 guidelines, analysis and halal food confirmation, Regulation and halal food act, government agency role to improve halal food – incentive and measure. The regulations and practice, current issue and halal food industries overview.

**Learning Outcomes:**

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

**CQB21103 Process Instrumentation & Control****Synopsis:**

This course introduces various aspects on fundamental of instrumentation, process control, industrial control system, control strategies and its applications in the industries.

**Learning Outcomes:**

1. Differentiate various types of process instrumentation and control system based on real applications in chemical industries.
2. Perform practical session and provide valid conclusion based on results, graphs and controller tuning data obtained.
3. Analyse understanding towards the importance of employing appropriate process instrumentation and control in chemical industries.

**CQB20603 Food Safety Toxicology****Synopsis:**

The subject is designed to provide students with an interactive overview to the general principles of food toxicology, with emphasis on different types of foodborne toxicants and the adverse effects of these food toxicants on humans. It furnishes students with analytical skills and conceptual framework to understand and assess food safety assurance strategies, especially regarding their importance within food-related industries.

**Learning Outcomes:**

1. Relate of potentially toxic constituents present in food products
2. Analyze with team members regarding current issue in food toxicology
3. Demonstrate the appropriate techniques and methods for determination toxin in food

**CQB20703 Hazard Analysis Critical Control Point (HACCP)****Synopsis:**

Students will be demonstrating the GMP and HACCP implementation in food industries. The guide a practical to the introduction of Prerequisite and HACCP programs will be presented. Enforcement Good Manufacturing Practice essential prerequisites for transition to the implementation of HACCP methodology will be discussed adequately. HACCP Plan, Internal Audit, Quality assurance and quality control, basic quality problems of food products and to present some statistical quality control tools with applications in the food industry, as well as to cover up-to-date topics of QC/QA as they relate to food industry and government relations.

**Learning Outcomes:**

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

**CQB20804 Food Quality And Standard****Synopsis:**

This course will introduce concept of quality assurance and quality control and its importance in food industry. This will include the current development and technology in practice that are inline with the local and global authorities standard. Students can expect to learn troubleshooting common problems arise in food industry with statistical quality control tools and other related measures. The course will

relate prior knowledge on types of hazard or contaminant (physical, chemical, microbiological) as well as statistical and sensory evaluation for ensuring products meeting set quality.

**Learning Outcomes:**

1. Evaluate the importance of quality assurance and quality control in food manufacturing
2. Integrate suitable food quality standards and practices for production of safe food products
3. Demonstrate the ability for self- directed learning and practice related to food quality and standard through practical, project and manual development.

**CQB20903 Food Product Design And Development**

**Synopsis:**

This course is intended to familiarize students with the product implementation stage of food product development including preliminary product description, prototype development, product testing and the formal presentation of a new product development. Students will learn the importance of teamwork, product specification, food formulation, food ingredient technology, ingredient interaction and how to conduct and terminate a project in an orderly manner. Students incorporate the principles taught in the food science and Technology core courses and apply them to the theoretical and practical considerations of commercial food product development. Teams of students will complete real food product development projects solicited from the food industry.

**Learning Outcomes:**

1. Construct ideas that may lead to the development of a new product.
2. Recognise problems that are amendable to the new product commercialization.
3. Collaborate with team members in planning and conducting an event to exhibit newly developed food products.
4. Propose a prototype or design of a new product to be commercialized.

**CQB21003 Food Waste Management System**

**Synopsis:**

This course will equip students with the fundamental knowledge in waste management system for food processing. It will introduce students to the relevant issues that related to management of food waste system. This include basic principle in legal, characterization, handling, collection, storage and processing. Therefore, the goal of the course is to provide sufficient exposure to fundamental of food waste management system and current practice in the industry.

**Learning Outcomes:**

1. Describe the principle of food waste management system
2. Perform an investigation food processing waste management system problems using data from relevant sources
3. Collaborate with team members in interpreting practical waste management problems associated with food process operations

**CQB30110 Applied Food Product Manufacturing**

**Synopsis:**

This course will provide students with the theoretical and practical aspects of food product manufacturing. This syllabus covers manufacturing of selected food commodities and the quality control of the finished products. Students also require to identify and providing solution in certain aspects of problems related to food manufacturing processes while adopting the Internet of Thing (IoT) and entrepreneurial elements.

**Learning Outcomes:**

1. Explain theoretical aspect of food product manufacturing
2. Display good quality control practice in the food product manufacturing processes
3. Solve problems related to food product manufacturing processes

**CQB30206 Applied Food Quality And Standard****Synopsis:**

This course will emphasize on the importance of quality assurance and quality control, quality problems of food products and to present some statistical quality control tools with applications in the food industry, as well as to cover up-to-date topics of QA/QC as they relate to food industry and government relations. Knowledge of quality control and their industrial application through physical, chemical, microbiological, statistical and sensory methods will be evaluated.

**Learning Outcomes:**

1. Explain the importance of quality assurance and quality control in food manufacturing
2. Relate food quality standards and practices in the production of safe food products
3. Demonstrate the ability for self-directed learning and practice in the work place through practical or assignment related to food quality and Standard

**CQB30306 Applied Halal Management System****Synopsis:**

The objective of this course is to produce competent Halal Executives equipped with knowledge and technological advances to serve the dynamic industrial sectors and regulatory and other government bodies relevant to Halal activities. This course provides a comprehensive and hands-on professional course on Halal Management System and a compulsory certificate in becoming a competent Halal Executive in Halal industry as required by JAKIM. The professional certificate-embedded course is recognized by Halal Professional Board (HPB), JAKIM.

**Learning Outcomes:**

1. Develop Halal manual and Halal Assurance System file for the halal certification
2. Perform online Halal application and mock internal halal audit
3. Demonstrate Halal Procedure and Process in obtaining the halal certification from JAKIM, Malaysia

**CQB30406 Applied Food Product Design And Development****Synopsis:**

This course is intended to familiarize students with the product implementation stage of food product development including preliminary product description, prototype development, product testing and the formal presentation of a new product development. Students will learn the importance of teamwork, product specification, food formulation, food ingredient technology, ingredient interaction and how to conduct and terminate a project in an orderly manner. Students incorporate the principles taught in the food science and Technology core courses and apply them to the theoretical and practical considerations of commercial food product development. Teams of students will complete real food product development projects solicited from the food industry.

**Learning Outcomes:**

1. Develop new potential products for open market and food service sector
2. Recognise problems that are amendable to the new product commercialization



3. Propose product specification for new products that follow food related certification requirement

### **CQB30506 Applied Food Safety And Legislation**

#### **Synopsis:**

This course covers the principles related to food laws, standard and legislation, food safety and management system, hazard risk in food ingredients, self inspection system and enforcement that is widely used and endorsed in Malaysia and internationally by industry, regulatory and consumer groups.

#### **Learning Outcomes:**

1. Categorize the risks of food hazards by outline the laws regarding the use of ingredients and additives required for the production of a product.
2. Demonstrate related skills according to food safety legislation
3. Reporting a scientific inquiry related to food safety and legislation

### **CQB30606 Applied Supply Chain Management System**

#### **Synopsis:**

This course covers various aspects of food supply chains in detail; to cover food supply chain from farm to fork, taking into consideration the various challenges and supporting mechanisms to make sure that the food reaching the plates is safe.

#### **Learning Outcomes:**

1. Categorize the different entities in the food supply chain
2. Construct idea in solving the operational challenges that relevant for the efficient operation of the chain
3. Identify issues in food supply chain management system

### **CQB30706 Applied Industrial Safety And Health**

#### **Synopsis:**

This course discusses the occupational safety, control method (to develop and implement appropriate control techniques for personal and workplace safety), chemical safety, health concept, biohazard level and control.

#### **Learning Outcomes:**

1. Perform analyses of risk related to occupational safety and health and comparing with statutory laws.
2. Analyze types of hazard related to workplace, appropriate control measures and risks associated with it.
3. Explain safety and health issues at workplace by comparing to Malaysian laws and regulations

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