

# 2025 PROGRAM HANDBOOK

## DEPARTMENT OF PETROCHEMICAL ENGINEERING

*DIPLOMA IN PROCESS  
ENGINEERING (PETROCHEMICAL)*

*DIPLOMA IN CHEMICAL ENGINEERING*

*DIPLOMA IN MECHANICAL  
ENGINEERING (PETROCHEMICAL)*

*DIPLOMA IN ELECTRICAL &  
INSTRUMENTATION ENGINEERING*

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## PREFACE

Praise be to Allah SWT, for with His permission and blessings, the Petrochemical Engineering Department (JKPK) Programme Guidebook has been successfully published. This guidebook is one of the Petrochemical Engineering Department's earnest efforts in providing a comprehensive, systematic, and well-structured reference for students, lecturers, and the community of Politeknik Tun Syed Nasir Syed Ismail (PTSN) in carrying out teaching and learning activities.

The publication of this guidebook is in line with the vision and mission of the Department of Polytechnic Studies, as well as the aspirations of PTSN, to produce graduates who are competent, of integrity, and competitive, particularly in the fields of process engineering (petrochemical), electrical and instrumentation engineering, mechanical engineering (petrochemical), and chemical engineering.

The contents of this book compile essential information regarding the national philosophy of education, curriculum structure, learning outcomes, career opportunities, and academic facilities provided to support the achievement of technical and vocational education and training (TVET) objectives.

It is hoped that this guidebook will serve as a primary reference for students throughout their studies, thereby assisting them in planning their academic pathway more systematically and purposefully. In addition, this book is also intended to serve as a guide for lecturers in ensuring the effective delivery of teaching and learning, in accordance with current industry demands.

The highest appreciation and sincere gratitude are extended to all parties who have contributed their energy, ideas, expertise, and commitment in the preparation and publication of this guidebook. May this endeavour bring optimum benefits and contribute towards the development of knowledgeable, skilled, resilient graduates who are capable of becoming agents of change for the nation's brighter future.

Thank you.

**AZMIR IQBAL BIN IBARAHIM**

Head of Petrochemical Engineering Department

# **VISION**

**To be the leading-edge  
TVET institution**

# **MISSION**

- To provide wide access to quality and recognized TVET programmes.
- To empower communities through lifelong learning.
- To develop holistic, entrepreneurial and balanced graduates.
- To capitalize on smart partnership with stakeholders.



# ***DIPLOMA IN PROCESS ENGINEERING (PETROCHEMICAL)***



# DIPLOMA IN PROCESS ENGINEERING (PETROCHEMICAL)

## INTRODUCTIONS

The New Industrial Master Plan 2030 (NIMP 2030) targets to build Malaysia's industrial capacity and resilience for long-term and sustainable growth. NIMP 2030 is designed to drive Malaysia's trajectory as a global leader in industrial development, extend the domestic linkages to create wealth across the nation as well as strengthen its position in the global value chain. Three key global trends are to leverage mature industrial infrastructure with good connectivity, strategic location, and reputation. Second, step up efforts to develop high-skilled talent and enhance TVET programmes. Third, to create new growth opportunities in green manufacturing, electric vehicles, and carbon capture, utilisation, and storage (CCUS). NIMP 2030 missions have been formulated to drive industry transformation at a large scale: to advance economic complexity, to tech up for a digitally vibrant nation, to push for net zero, and to safeguard economic security and inclusivity.

The Twelfth Malaysia Plan (12MP) policy improving the educational ecosystem and technical and vocational training (TVET) to develop talent available time the front will be known as the driver changes to meet demand industry better. Industry 4.0 refers to the intelligent networking of machines and processes using information and communication technology (ICT). Industry 4.0 transforms manufacturing processes from product design to fabrication, operation, and maintenance. It fosters automation and data exchange in manufacturing technologies and processes through physical-cyber systems. Industry 4.0, a subset of the 4IR, focuses on the manufacturing sector, whereas 4IR encompasses every industry and all aspects of human life.

The petroleum and petrochemicals industry are one of the leading industries in Malaysia. Petrochemicals are chemicals that are derived from petroleum or natural gas. Petrochemicals are used to manufacture thousands of different products that people use daily, including plastics, rubber, textiles, medicines, cosmetics, furniture, electronics, solar power panels, and many more. The petrochemicals industry plays a major role in the chemical industry as the demand for the synthetic materials grows continually year by year. Strong petrochemicals demand in Malaysia and the world market is believed to be led by rapid growth in consumption in many industry sectors. This positive demand is a key factor that contributes to the growth of a country's economies as per capita.

Diploma in Process Engineering (Petrochemical) for polytechnic is developed to give balance emphasis on theoretical and practical aspects. Thus, to keep abreast with rapid demand in the TVET sector, the Department of Polytechnic and Community College Education (DPCCE) progressively collaborates with major industry players in the country in developing the curriculum. The Diploma in Process Engineering (Petrochemical) programme will take six semesters to complete, five academic semesters at their respective polytechnics and one semester of industrial training at relevant industries during the final semester. This programme complies with the Malaysian Qualifications Agency (MQA) and Board of Engineer Malaysia (BEM) /Engineering Technology Accreditation Council (ETAC).

## **SYNOPSIS**

The Diploma in Process Engineering (Petrochemical) programme is designed to produce holistic graduates who have knowledge and competent skills in the field of process engineering (Petrochemical) to fulfil the demand of workers in the engineering sector. The programme structure focuses on the areas of Occupational, Safety and Health for Process Engineering, Mass and Energy Balance, Chemistry, Thermodynamics, Mechanical Plant Equipment, Heat and Mass Transfer, Fluid Mechanics, Separation Process, Process Control, Instrumentation and Electrical, Process Design, Reactor Technology, Programming Method for Process Engineering and Renewable and Sustainable Energy Engineering.

## **JOB PROSPECT**

This programme provides the knowledge and skills in Process Engineering (Petrochemical) field that can be applied to a broad range of careers in Process Engineering (Petrochemical). The knowledge and skills that the students acquire from the programme will enable them to participate in the job market as:

- a. Assistant Engineer
- b. Technical Assistant
- c. Assistant Service Manager
- d. Service Advisor
- e. Supervisor
- f. Process Technician
- g. Plant Operator
- h. Panel Operator
- i. Technical Instructor
- j. Technical Sales Executive / Engineer
- k. Draughter / Designer
- l. Entrepreneur
- m. Adjuster
- n. Product Demonstrator

## PROGRAMME AIMS

The programme believes that every individual has potential and the programme aims to develop adaptable and responsible Senior Assistant Engineers to support government aspiration to increase workforce in engineering related field.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

Within a few years after completing Diploma in Process Engineering (Petrochemical), graduates are able to:

- PEO1 : proficient with industry-relevant knowledge and skills in process engineering (petrochemical) field.
- PEO2 : engaging on lifelong and continuous learning to enhance knowledge and skills.
- PEO3 : acquire with entrepreneurial skills and mind set in the real working environment.
- PEO4 : established links with society and players in the industry.

## PROGRAMME LEARNING OUTCOMES (PLO)

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

- PLO1: Apply knowledge of applied mathematics, applied science, computer and engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices in area of process engineering (petrochemical);
- PLO2: Identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to process engineering (petrochemical) field (DK1 to DK4);
- PLO3: Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental considerations in area of process engineering (petrochemical) (DK5);
- PLO4: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements (DK8);
- PLO5: Apply appropriate techniques, resources, and modern engineering computing and IT tools to well-defined engineering problems, with an awareness of the limitations (DK2 and DK6);
- PLO6: Consider sustainable development impacts\* to: society, the economy,

sustainability, health and safety, legal frameworks, and the environment, in solving well- defined engineering problems (DK1, DK5 and DK7);

PLO7: Understand and commit to professional ethics and responsibilities and norms of technician practice and including compliance with national and international laws. Demonstrate an understanding of the need for diversity and inclusion (DK9);

PLO8: Function effectively as an individual, and as a member in diverse and inclusive teams in multi-disciplinary, face-to-face, remote and distributed settings (DK9);

PLO9: Communicate effectively and inclusively on well-defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions;

PLO10: Demonstrate awareness of engineering management principles as a member or leader in a technical team and to manage projects in multidisciplinary environments;

PLO11: Recognise the need for and have the ability for i) independent and lifelong learning and ii) critical thinking in the face of specialised technical knowledge (DK8).

\*Represented by the 17 UN Sustainable Development Goals (UN-SDG)

### **Notes:**

DK 1 : A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline and awareness of directly relevant social sciences.

DK 2 : Procedural mathematics, numerical analysis, statistics applicable in a sub-discipline.

DK 3 : A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline.

DK 4 : Engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline.

DK 5 : Knowledge that supports engineering design and operations based on the techniques and procedures of a practice area.

DK 6 : Codified practical engineering knowledge in recognized practice area.

- DK 7 : Knowledge of issues and approaches in engineering technician practice, such as public safety and sustainable development.
- DK 8 : Engagement with the current technological literature of the practice area.
- DK 9 : Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

## PROGRAMME STRUCTURE (SEM 1- SEM 6)

| COURSE TYPE       | COURSE CODE | COURSE NAME   | CONTACT HOURS |   |   |   | PROGRAMME LEARNING-OUTCOME (PLO) |      |      |      |      |      |      |      |      |       |       | PREREQUISITE |    |           |          |
|-------------------|-------------|---|---------------|---|---|---|----------------------------------|------|------|------|------|------|------|------|------|-------|-------|--------------|----|-----------|----------|
|                   |             |   | L             | P | T | O | CREDIT VALUES                    |      |      |      |      |      |      |      |      |       |       |              |    |           |          |
|                   |             |   |               |   |   |   | PLO1                             | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 | PLO10 | PLO11 |              |    |           |          |
| <b>SEMESTER 1</b> |             |   |               |   |   |   |                                  |      |      |      |      |      |      |      |      |       |       |              |    |           |          |
| Compulsory        | DUE10062    | Technical English 1                                       | 1             | 0 | 2 | 0 | 2                                |      |      |      |      |      |      |      |      |       |       | A3           | A3 | A2        |          |
|                   | MPU24031    | Sukan 1   |               |   |   |   |                                  |      |      |      |      |      |      |      |      |       |       |              |    |           |          |
|                   | MPU24041    | Kelab / Persatuan 1                                       | 0             | 2 | 0 | 0 | 1                                |      |      |      |      |      |      |      |      |       | A3    | A3           |    |           |          |
|                   | MPU24XX1    | Unit Beruniform 1   |               |   |   |   |                                  |      |      |      |      |      |      |      |      |       |       |              |    |           |          |
| Common Core       | DBM10163    | Engineering Mathematics 1                                 | 2             | 0 | 2 | 0 | 3                                | C3   | C3   |      |      |      |      |      |      |       |       | A3           |    |           |          |
|                   | DBS10042    | Engineering Science                                       | 2             | 1 | 0 | 0 | 2                                | C3   |      |      |      |      |      | A3   |      |       |       |              |    |           |          |
| Discipline Core   | DGP10283    | Electrical Technology                                     | 2             | 2 | 0 | 0 | 3                                | C3   |      |      |      |      | P4   |      |      |       |       | A2           |    |           |          |
|                   | DGP10293    | Applied Chemistry   | 2             | 2 | 0 | 0 | 3                                | C3   |      |      |      |      | P4   |      |      |       |       | A2           |    |           |          |
|                   | DGP10302    | Computer Aided Design                                     | 0             | 3 | 0 | 0 | 2                                |      |      | P3   |      | P4   |      |      | A3   |       |       |              |    |           |          |
|                   | DGP10512    | Occupational Safety and Health for Process Engineering    | 2             | 0 | 0 | 0 | 2                                | C3   |      |      |      | A3   |      | A3   |      |       |       |              |    |           |          |
| <b>TOTAL</b>      |             |   | <b>23</b>     |   |   |   | <b>18</b>                        |      |      |      |      |      |      |      |      |       |       |              |    |           |          |
| <b>SEMESTER 2</b> |             |   |               |   |   |   |                                  |      |      |      |      |      |      |      |      |       |       |              |    |           |          |
| Compulsory        | MPU21072    | Penghayatan Etnik dan Peradaban                           | 1             | 0 | 2 | 0 | 2                                |      |      |      |      |      |      | A3   | A2   | A2    |       |              |    |           |          |
|                   | MPU24051    | Sukan 2   |               |   |   |   |                                  |      |      |      |      |      |      |      |      |       |       |              |    | MPU 24XX1 |          |
|                   | MPU24061    | Kelab / Persatuan 2                                       | 0             | 2 | 0 | 0 | 1                                |      |      |      |      |      |      |      |      |       | A2    | A3           |    | MPU 24XX1 |          |
|                   | MPU24XX1    | Unit Beruniform 2   |               |   |   |   |                                  |      |      |      |      |      |      |      |      |       |       |              |    | MPU 24XX1 |          |
| Common Core       | DBM20173    | Engineering Mathematics 2                                 | 2             | 0 | 2 | 0 | 3                                | C3   | C3   |      |      |      |      |      |      |       |       | A3           |    | DBM10163  |          |
|                   | DGP20313    | Thermodynamics  | 2             | 2 | 0 | 0 | 3                                | C3   |      |      |      |      | P4   |      |      |       |       | A2           |    |           |          |
| Discipline Core   | DGP20323    | Process Plant Equipment                                   | 2             | 2 | 0 | 0 | 3                                | C3   |      |      |      |      | P4   |      |      |       |       |              | A3 |           |          |
|                   | DGP20333    | Fluid Mechanics   | 2             | 2 | 0 | 0 | 3                                | C3   |      |      |      |      | P4   |      |      |       |       | A2           |    |           |          |
| Specialization    | DGP20343    | Chemistry of Petrochemical Processes                      | 2             | 2 | 0 | 0 | 3                                | C3   |      |      |      |      | P4   | A3   |      |       |       |              |    |           |          |
| <b>TOTAL</b>      |             |   | <b>25</b>     |   |   |   | <b>18</b>                        |      |      |      |      |      |      |      |      |       |       |              |    |           |          |
| <b>SEMESTER 3</b> |             |   |               |   |   |   |                                  |      |      |      |      |      |      |      |      |       |       |              |    |           |          |
| Compulsory        | DUE30072    | Technical English 2                                       | 1             | 0 | 2 | 0 | 2                                |      |      |      |      |      |      |      |      |       |       | A2           | A3 | A3        | DUE10062 |
| Common Core       | DBM30183    | Engineering Mathematics 3                                 | 2             | 0 | 2 | 0 | 3                                | C3   | C3   |      |      |      |      |      |      |       |       | A3           |    |           | DBM10173 |
| Discipline Core   | DGP30353    | Process Instrumentation and Control                       | 2             | 2 | 0 | 0 | 3                                | C3   |      |      |      |      | P3   |      |      |       |       | A4           |    |           |          |
|                   | DGP30363    | Heat Transfer   | 2             | 2 | 0 | 0 | 3                                | C3   |      |      |      |      | P4   |      |      |       |       |              |    | A3        | DGP20313 |
|                   | DGP30373    | Mass and Energy Balance                                   | 2             | 2 | 0 | 0 | 3                                | C3   |      |      |      |      | P4   |      |      |       |       | A3           |    |           | DGP10293 |
| Specialization    | DGP30383    | Piping and Instrumentation Diagram in Petrochemical Plant | 1             | 3 | 0 | 0 | 3                                | C3   |      |      |      |      | P2   |      |      |       |       | A2           |    |           |          |
| <b>TOTAL</b>      |             |   | <b>23</b>     |   |   |   | <b>17</b>                        |      |      |      |      |      |      |      |      |       |       |              |    |           |          |

| SEMESTER 4          |           |  |           |   |   |   |    |           |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
|---------------------|-----------|--|-----------|---|---|---|----|-----------|--|----|----|----|----|----|----|----|----|----|----|----|--|----|----|----------|----------|
| Common Core         | DUU10072  | Entrepreneurship                             | 1         | 2 | 0 | 0 | 2  |           |  |    |    |    | P2 |    |    |    | A3 | A3 |    |    |  |    |    |          |          |
| Compulsory          | MPU22071  | Kursus Integriti dan Anti-Rasuah             | 0         | 0 | 2 | 0 | 1  |           |  |    |    |    |    |    |    |    | A3 | A2 |    |    |  |    | A2 |          |          |
| Discipline Core     | DGP40392  | Programming Method for Process Engineering   | 1         | 2 | 0 | 0 | 2  | C3        |  |    |    |    | P4 |    |    |    |    |    |    |    |  |    | A3 |          |          |
|                     | DGP40402  | Project 1                                    | 1         | 2 | 0 | 0 | 2  |           |  |    | C3 |    | P4 |    |    |    |    |    |    |    |  | A3 | A3 |          |          |
| Specialization      | DGP40413  | Petrochemical Polymer                        | 2         | 2 | 0 | 0 | 3  | C3        |  |    |    |    | P4 |    |    |    |    |    |    |    |  |    | A2 |          |          |
|                     | DGP40423  | Petrochemical Process Technology             | 2         | 2 | 0 | 0 | 3  |           |  |    | C3 |    | P4 |    |    |    |    |    |    |    |  |    | A2 |          |          |
| Electives           | DGPXXXXX  | Elective***                                  | 3         | 0 | 0 | 0 | 3  |           |  | C3 | C3 |    |    |    |    |    |    |    |    |    |  |    | A3 |          |          |
| <b>TOTAL</b>        |           |  | <b>22</b> |   |   |   |    | <b>16</b> |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| SEMESTER 5          |           |  |           |   |   |   |    |           |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| Compulsory          | MPU23182  | Sains Teknologi dan Kejuruteraan Islam*      | 1         | 0 | 2 | 0 | 2  |           |  |    |    |    |    |    |    |    | A4 | A3 | A2 |    |  |    |    |          |          |
|                     | MPU23172  | Nilai Masyarakat Malaysia**                  |           |   |   |   |    |           |  |    |    |    |    |    |    |    |    | A4 | A3 | A2 |  |    |    |          |          |
|                     | DUE50082  | Technical English 3                          | 1         | 0 | 2 | 0 | 2  |           |  |    |    |    |    |    |    |    |    |    |    |    |  | A4 | A4 | A3       | DUE30072 |
| Common Core         | DJ30332   | Engineering and Society                      | 2         | 0 | 0 | 0 | 2  |           |  |    |    |    |    |    |    |    | C3 | C4 |    |    |  |    | A3 |          |          |
| Discipline Core     | DGP50433  | Project 2                                    | 1         | 4 | 0 | 0 | 3  |           |  |    |    | C4 | P4 |    |    |    |    |    |    |    |  | A3 | A3 | DGP40402 |          |
| Specialization      | DGP50443  | Pollution Control in Petrochemicals Industry | 2         | 2 | 0 | 0 | 3  | C4        |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
|                     | DGP50452  | Petrochemical Production Processes           | 2         | 0 | 0 | 0 | 2  | C4        |  |    | C3 |    |    |    |    |    |    |    |    |    |  |    |    | A3       |          |
| <b>TOTAL</b>        |           |  | <b>19</b> |   |   |   |    | <b>14</b> |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| SEMESTER 6          |           |  |           |   |   |   |    |           |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| Industrial Training | DUT600610 | Engineering Industrial Training              | 0         | 0 | 0 | 0 | 10 |           |  |    |    |    |    | P4 | A3 | A5 | P4 | A4 |    |    |  |    | P4 |          |          |
| <b>TOTAL</b>        |           |  | <b>0</b>  |   |   |   |    | <b>10</b> |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| ELECTIVES           |           |  |           |   |   |   |    |           |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| 1                   | DGP40462  | Renewable and Sustainable Energy Engineering |           |   |   |   |    |           |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| 2                   | DGP40473  | Petroleum Technology                         |           |   |   |   |    |           |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| 3                   | DGP40483  | Industrial Management                        | 3         | 0 | 0 | 0 | 3  |           |  | C3 | C3 |    |    |    |    |    |    |    |    |    |  |    |    | A3       |          |
| 4                   | DGP40493  | Utility Plant                                |           |   |   |   |    |           |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| 5                   | DGP40503  | Reactor in Petrochemicals Industry           |           |   |   |   |    |           |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| FREE ELECTIVES      |           |  |           |   |   |   |    |           |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          |          |
| 1                   | DUD10012  | Design Thinking                              | 1         | 0 | 0 | 1 | 2  | C2        |  |    |    |    |    |    |    |    |    |    |    |    |  |    |    |          | A3       |

| Course Type           | Total Credit | Total %     |
|-----------------------|--------------|-------------|
| i Compulsory          | 15           | 30%         |
| ii Common Core        | 13           |             |
| iii Discipline Core   | 35           | 67%         |
| iv Specialization     | 17           |             |
| v Industrial Training | 10           |             |
| vi Electives          | 3            | 3%          |
| <b>Total Credit</b>   | <b>93</b>    | <b>100%</b> |

| Engineering and Engineering Technology Courses                      |      |           |
|---|------|-----------|
| Total Credit (Discipline Core, Specialization, Industrial Training) |      | <b>65</b> |
|   |      | <b>30</b> |
|   |      | <b>%</b>  |
| i Practice - Oriented Components                                    | 30.9 | 48%       |
| ii Engineering Technology (Specialization)                          | 17   | 26%       |

## SYNOPSIS AND LEARNING OUTCOMES (CLO) (SEM 1- SEM 6)

| SEMESTER | COURSE                        | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|-------------------------------|--------|---------------|---|---|
| 1        | DUE 10062 TECHNICAL ENGLISH 1 | 2      | NONE          | <p>TECHNICAL ENGLISH 1 is designed to provide technical students the language input and skills required in technical Workplace communication. This course aims to prepare students to use language skills to achieve B2 level which is becoming independent language users. Students will be exposed to skills required for effective participation in group discussions contextualized in workplace safety and health issues. The course also includes input and presentation skills on how to use the language appropriately in describing, comparing, and contrasting objects/products relevant to students' respective engineering disciplines. The course will enable students to make verbal and written enquiries related to objects/products for workplace use. The course is also designed to assist students in achieving at least level B1 of Common European Framework of Reference (CEFR).</p> | <p>CLO1:<br/>Discuss work-related topic using effective communication skills by responding to workplace safety and hazards relevant to engineering technician practice.<br/>(A2, PLO11)</p> <p>CLO2:<br/>Explain the features and characteristics of objects/ products used in a well-defined technical activities.<br/>(A3, PLO9)</p> <p>CLO3:<br/>Share effective communication skills in making and responding to enquiries related to a well-defined engineering activities.<br/>(A3, PLO9)</p> |

| SEMESTER | COURSE                              | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|-------------------------------------|--------|---------------|---|---|
| 1        | DBM 10163 ENGINEERING MATHEMATICS 1 | 3      | NONE          | <p>ENGINEERING MATHEMATICS 1 exposes students to basic algebra including resolving partial fractions. This course also covers the concept of trigonometry and the method to solve trigonometry problems by using basic identities, compound angle and double angle formulae. Students will be introduced to the theory of complex numbers and the concept of vector and scalar. Students will explore advanced matrices involving a 3x3 matrix.</p> | <p>CLO1 :<br/>Use mathematical statement to describe relationship between various physical phenomena. (C3, PLO1)</p> <p>CLO2 :<br/>Show mathematical solutions using the appropriate techniques in mathematics. (C3, PLO2)</p> <p>CLO3 :<br/>Use mathematical expression in describing real engineering problems precisely, concisely and logically. (A3, PLO8)</p> |

| SEMESTER | COURSE                        | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|-------------------------------|--------|---------------|--|--|
| 1        | DBS 10042 ENGINEERING SCINECE | 2      | NONE          | <p>ENGINEERING SCIENCE course introduces the physical concepts required in engineering disciplines. Students will learn the knowledge of fundamental physics in order to identify and solve engineering physics problems. Students will be able to perform experiments and activities to mastery physics concepts.</p> | <p>CLO1 :<br/>Use basic physics concept to solve engineering physics problems.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Use knowlegde of fundamental physics in real engineering activities accurately.<br/>(A3, PLO6)</p> <p>CLO3 :<br/>Perform appropriate activities related to physics concept.<br/>(P3, PLO2)</p> |

| SEMESTER | COURSE                          | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|---------------------------------|--------|---------------|---|--|
| 1        | DGP 10283 ELECTRICAL TECHNOLOGY | 3      | NONE          | <p>ELECTRICAL TECHNOLOGY exposes students to concepts of basic electrical, electromagnetism and transformers. The course focuses on different types of electrical circuits, the relationship between current and voltage including resistance. It also provides skills in measuring the electrical quantities, constructing basic circuits and operating transformer.</p> | <p>CLO1 :<br/>Apply the basic principles and fundamentals of Electrical Technology to solve electrical circuit problems. (C3 , PLO1)</p> <p>CLO2 :<br/>Measures electrical quantities using multimeter in series , parallel and series parallel circuit. (P4 , PLO5)</p> <p>CLO3 :<br/>Perform individual capability in working as a team member to complete the task. (A2 , PLO8)</p> |

| SEMESTER | COURSE                      | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|-----------------------------|--------|---------------|---|---|
| 1        | DGP 10293 APPLIED CHEMISTRY | 3      | NONE          | <p>APPLIED CHEMISTRY is designed to provide students with knowledge related to the principles of general chemistry. It emphasizes the principles of applying the theories to practical problems involving the fundamental of chemistry. This course covers the structure of the atom, matter, mole concept, periodic table, chemical bonding, acid-base concepts, oxidation-reduction and chemical equilibrium.</p> | <p>CLO1 :<br/>Solve basic principle of physical chemistry to provide a fundamental in applying chemistry concepts.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Perform proper laboratory techniques, experimental procedure, the scientific method and problem-solving process skills as used in the study of chemistry.<br/>(P4, PLO5)</p> <p>CLO3 :<br/>Perform individual capability in working as a team member to complete the task.<br/>(A2, PLO8)</p> |

| SEMESTER | COURSE                          | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|----------|---------------------------------|--------|---------------|--|---|
| 1        | DGP 10302 COMPUTER AIDED DESIGN | 2      | NONE          | <p>COMPUTER AIDED DESIGN introduces and provides knowledge to Computer Aided Design (CAD) software application in developing engineering drawing particularly in technical drawing. This course will enable students to explore the software from its graphical user interface to command features including data entry, draw, modify, display control, drawing aids, layer, block, insert, dimensioning, hatching and plotting.</p> | <p>CLO1 :<br/>Construct efficiently the Computer Aided Design Software knowledge including software requirement, user interface, options feature and starting. (P3 , PLO3)</p> <p>CLO2 :<br/>Construct precisely 2D drawing using Computer Aided Design (CAD) software to represent the behavior of plant control system. (P4 , PLO5)</p> <p>CLO3 :<br/>Display behavior consistent with a positive ethic to complete work independently and complex control methodologies in order to perform corrective actions to minimize errors in the control system. (A3 , PLO7)</p> |

| SEMESTER | COURSE  | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|---|--------|---------------|---|---|
| 1        | DGP 10512 OCCUPATIONAL SAFETY AND HEALTH FOR PROCESS ENGOIENERING | 2      | NONE          | <p>OCCUPATIONAL SAFETY AND HEALTH FOR PROCESS ENGINEERING course is designed to impart understanding of the self-regulatory concepts and provisions under the Occupational Safety &amp; Health Act (OSHA) in Malaysia. This course presents the responsibilities of workers in implementing and complying with the safety procedures at work. Understanding of notifications of accidents, dangerous occurrences, poisoning and diseases and liability for offences will be imparted to students. This course will also provide an understanding of the key issues in OSH Management, Incident Prevention, Chemical Safety, Hazard Identification Risk Control and Risk Assessment (HIRARC), Fire Safety, Workplace Environment and Ergonomics and guide the students gradually into this multi-disciplinary science.</p> | <p>CLO1 :<br/>Apply Occupational Safety and Health (OSH) procedures, regulations and its compliance in Malaysia.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Describe hazards, risk and safe work practices in order to maintain health and safe work environment.<br/>(A3 , PLO4)</p> <p>CLO3 :<br/>Justify the factor that can lead to safety and health issues related workplace environment and ergonomics.<br/>(A3 , PLO6)</p> |

| SEMESTER | COURSE                                    | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|---|--------|---------------|---|--|
| 2        | MPU 21072 PENGHAYATAN ETIKA DAN PERADABAN | 2      | NONE          | <p>PENGHAYATAN ETIKA DAN PERADABAN ini menjelaskan tentang konsep etika daripada perspektif peradaban yang berbeza. Ia bertujuan bagi mengenal pasti sistem, tahap perkembangan, kemajuan dan kebudayaan merentas bangsa dalam mengukuhkan kesepaduan sosial. Selain itu, perbincangan dan perbahasan berkaitan isu-isu kontemporari dalam aspek ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban dapat melahirkan pelajar yang bermoral dan profesional. Penerapan amalan pendidikan berimpak tinggi (HIEPs) yang bersesuaian digunakan dalam penyampaian kursus ini.</p> | <p>CLO1:<br/>Membentangkan konsep etika dan peradaban dalam kepelbagaian tamadun. (A2, PLO7)</p> <p>CLO2:<br/>Menerangkan proses pemeraksanaan kesepaduan sosial merentas bangsa di Malaysia. (A2, PLO8)</p> <p>CLO3:<br/>Mencadangkan sikap yang positif terhadap isu dan cabaran kontemporari dari perspektif etika dan peradaban. (A3, PLO10)</p> |

| SEMESTER | COURSE                              | CREDIT | PRE REQUISITE                       | SYNOPSIS  | CLO   |
|----------|-------------------------------------|--------|-------------------------------------|---|---|
| 2        | DBM 20173 ENGINEERING MATHEMATICS 2 | 3      | DBM 10163 ENGINEERING MATHEMATICS 1 | <p>ENGINEERING MATHEMATICS 2 exposes students to the basic laws of indices and logarithms. This course introduces the basic rules of differentiation concepts to solve problems that relate to maximum, and minimum and calculate the rates of changes. This course discusses integration concepts in order to strengthen students' knowledge for solving area and volume-bounded region problems. In addition, students will learn the application of both techniques of differentiation and integration</p> | <p>CLO1:<br/>Explain the relationship between various physical phenomena in algebra and calculus. (C3, PLO1)</p> <p>CLO2:<br/>Solve mathematics problems by using appropriate and relevant fundamentals calculus techniques. (C3, PLO2)</p> <p>CLO3:<br/>Use mathematics language to express mathematics ideas and arguments precisely, concisely and logically in calculus. (A3, PLO8)</p> |

| SEMESTER | COURSE                   | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|--------------------------|--------|---------------|---|---|
| 2        | DGP 20313 THERMODYNAMICS | 3      | NONE          | <p>THERMODYNAMICS introduces students to basic thermodynamics concepts such as the perfect gas law, steam properties, non-flow and flow processes, the First Law and Second Law of thermodynamics, the Carnot and Rankine cycles, and Gibbs Free Energy. Additionally, this course will impart knowledge and understanding of theory, concepts, and the application of principles to solve problems pertaining to thermodynamics processes. This course also exposes students to demonstrations of thermodynamics experiments using real equipment.</p> | <p>CLO1 :<br/>Apply the thermodynamics law and chemical equilibrium related to process engineering. (C3 , PLO1)</p> <p>CLO2 :<br/>Organizes experiments appropriately according to the Standard Operating Procedures. (P4 , PLO5)</p> <p>CLO3 :<br/>Perform individual capability in working as a team member to complete the task. (A2 , PLO8)</p> |

| SEMESTER | COURSE                            | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|-----------------------------------|--------|---------------|---|---|
| 2        | DGP 20323 PROCESS PLANT EQUIPMENT | 3      | NONE          | <p>PROCESS PLANT EQUIPMENT provides knowledge on the concepts and basic principles of plant static and rotary equipment. The course emphasizes the general uses and basic operating principles of static and rotary equipment such as valves, pipes, furnaces, boilers, heat exchangers, pumps, compressor, turbines and internal combustion engine. Students will be introduced to the classifications, types and specific functions of the stated components above.</p> | <p>CLO1 :<br/>Apply process plant equipment according to its classification, types, application and operating principle.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Perform proper procedures in operating and maintaining process plant equipment according to standard operating procedure.<br/>(P4, PLO5)</p> <p>CLO3 :<br/>Demonstrate specific process plant equipment according to their functions and operating principle in a process plant.<br/>(A3, PLO11)</p> |

| SEMESTER | COURSE                    | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|---------------------------|--------|---------------|---|---|
| 2        | DGP 20333 FLUID MECHANICS | 3      | NONE          | <p>FLUID MECHANICS introduces and provides knowledge of the basic principles and concepts of fluid mechanics with applications to practical engineering situations. This course will enable students to learn about fluid properties, statics, and dynamics. This course also exposes the students to measuring flow rates and solving fluid mechanics problems in fluid flow and pipe systems.</p> | <p>CLO1 :<br/>Solve problems related to fluid properties, fluid statics and fluid dynamics.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Perform practical work in fluid mechanics process application.<br/>(P4, PLO5)</p> <p>CLO3 :<br/>Participate actively and build teamwork among group members to perform laboratory work.<br/>(A2, PLO8)</p> |

| SEMESTER | COURSE   | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|--|--------|---------------|---|---|
| 2        | DGP 20343 CHEMISTRY OF PETROCHEMICAL PROCESSES | 3      | NONE          | <p>CHEMISTRY OF PETROCHEMICAL PROCESSES focuses on the chemistry of various petrochemical processes. It emphasizes the chemical reactions and their derivatives of hydrocarbon. Students should be able to describe the chemical reactions and processes involved in transforming petroleum-based hydrocarbons into the chemicals of the petrochemicals industry.</p> | <p>CLO1 :<br/>Apply the principles of chemistry to petrochemical processes. (C3 ,PLO1)</p> <p>CLO2 :<br/>Perform the experiments involving chemistry in the petrochemical processes. (P4 ,PLO5)</p> <p>CLO3 :<br/>Explain the chemistry of the various petrochemical processes in industry and daily life. (A3 ,PLO6)</p> |

| SEMESTER | COURSE                        | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|----------|-------------------------------|--------|---------------|--|---|
| 3        | DUE 30072 TECHNICAL ENGLISH 2 | 2      | NONE          | <p>TECHNICAL ENGLISH 2 equips technical students with the required language skills to communicate effectively at the workplace mainly in describing process and procedures as well as giving instructions. It is also designed to develop students' skills in conducting and participating in meetings and responding appropriately to complaints related to specific situations. This content structure reflects the stated course learning outcomes to be achieved by the students in order to develop their interpersonal &amp; communication skills. It will enable them to independently participate in technical discussion in work-context. This course also aims to prepare students to use language skills to achieve B2 of CEFR level.</p> | <p>CLO1:<br/>Practice effective oral presentation skills in the context of process, procedure and instruction in workplace situations using appropriate language. (A2, PLO9)</p> <p>CLO2:<br/>Demonstrate effective communication and social skills in conducting and participating in meetings in workplace situations. (A3, PLO9)</p> <p>CLO3:<br/>Propose appropriate response(s) to complaints related to workplace situations. (A3, PLO11)</p> |

| SEMESTER | COURSE                              | CREDIT | PRE REQUISITE                       | SYNOPSIS  | CLO  |
|----------|-------------------------------------|--------|-------------------------------------|---|--|
| 3        | DBM 30183 ENGINEERING MATHEMATICS 3 | 3      | DBM 20173 ENGINEERING MATHEMATICS 2 | <p>ENGINEERING MATHEMATICS 3 exposes students to statistical and probability concepts and their applications in interpreting data. The course also introduces the numerical methods concept to solve simultaneous equations by using the Gaussian Elimination method, LU Decomposition using Doolittle and Crout methods, polynomial problems using Simple Fixed-Point Iteration and Newton-Raphson methods. To strengthen the students in solving engineering problems, Ordinary Differential Equation (ODE) is also included. In addition, the course also discusses optimization problems by using Linear Programming. It is designed to build students' teamwork and problems solving skills.</p> | <p>CLO1 :<br/>Demonstrate mathematical concepts, formulate methods of solutions and select appropriate techniques for solving routine mathematics problems.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Apply mathematical methods and concepts to solve engineering problems.<br/>(C3 , PLO2)</p> <p>CLO3 :<br/>Express mathematics ideas clearly by using correct mathematical terminology and proper mathematical notation.<br/>(A3 , PLO8)</p> |

| SEMESTER | COURSE  | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|----------|---|--------|---------------|--|---|
| 3        | DGP 30353 PROCESS INSTRUMENTATION AND CONTROL | 3      | NONE          | <p>PROCESS INSTRUMENTATION AND CONTROL provides knowledge about measurement equipment used in the industry, understanding the basic principles and the job lists of instruments. This course will include the basic theory, construction, operation and usage of pneumatic equipment, control valves, transmitters, converters and controllers. Students will understand the basic principle of control systems and their usage according to petrochemical plant situations.</p> | <p>CLO1:<br/>Apply the fundamentals of process control systems, measurement, and the working principles of plant equipment used in process plant. (C3,PLO1)</p> <p>CLO2:<br/>Measures the plant instrumentation equipment and process control systems applied in process plant. (P3, PLO5)</p> <p>CLO3:<br/>Organize teamwork during laboratory work on the basic principle of control system to achieve the goal. (A4, PLO8)</p> |

| SEMESTER | COURSE                  | CREDIT | PRE REQUISITE            | SYNOPSIS   | CLO  |
|----------|-------------------------|--------|--------------------------|--|--|
| 3        | DGP 30363 HEAT TRANSFER | 3      | DGP 20313 THERMODYNAMICS | <p>HEAT TRANSFER emphasises the principles of Heat Transfer in a steady state by conduction, convection and radiation. The principles of steady-state and transient heat conduction in solids are investigated. Laminar and turbulent boundary layer flows are treated, as are condensation and boiling phenomena, thermal radiation, and radiation heat transfer between surfaces. Students will be exposed to the procedures for general problem solving and their application to heat exchangers.</p> | <p>CLO1:<br/>Apply the engineering principles and basic mechanisms of heat transfer in a steady state condition. (C3, PLO1)</p> <p>CLO2:<br/>Perform practical works in the heat transfer process application. (P4, PLO5)</p> <p>CLO3:<br/>Justify using knowledge of heat transfer through its application. (A3, PLO11)</p> |

| SEMESTER | COURSE                            | CREDIT | PRE REQUISITE               | SYNOPSIS   | CLO  |
|----------|-----------------------------------|--------|-----------------------------|--|--|
| 3        | DGP 30373 MASS AND ENERGY BALANCE | 3      | DGP 10293 APPLIED CHEMISTRY | <p>MASS AND ENERGY BALANCE is designed as an introduction to the fundamentals of material and energy balance. The emphasis is on understanding the principles of material and energy balances in chemical process systems. This course will develop students ability to solve and perform mass and energy balance problems in the chemical process industry.</p> | <p>CLO1:<br/>Solve the basic principles of engineering calculation involving mass and energy balance in the chemical process systems.<br/>(C3, PLO1)</p> <p>CLO2:<br/>Perform appropriate technique when handling process engineering equipment.<br/>(P4, PLO5)</p> <p>CLO3:<br/>Describe the principles and techniques of mass and energy balance in the chemical process industry through group work.<br/>(A3, PLO8)</p> |

| SEMESTER | COURSE   | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|--|--------|---------------|---|--|
| 3        | DGP30383 PIPING AND INSTRUMENTATION DIAGRAM IN PETROCHEMICAL PLANT | 2      | NONE          | <p>PIPING AND INSTRUMENTATION DIAGRAM IN PETROCHEMICAL PLANT provides knowledge of recognizing symbols used in process flow diagram including equipment, piping and instrument. This course also provides practical skills in reading piping and instrumentation diagram (P&amp;ID) on the actual process to enable students to read and to draw in the industry.</p> | <p>CLO1:<br/>Construct the appropriate piping identification system, instruments and control system of a flow diagram in a plant operation.<br/>(C3, PLO1)</p> <p>CLO2:<br/>Explains the design of symbols and types of processes in a flow diagram.<br/>(P2, PLO5)</p> <p>CLO3:<br/>Discuss ideas clearly in groups when performing a given task in reading piping and instrumentation diagrams.<br/>(A2, PLO8)</p> |

| SEMESTER | COURSE                     | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|----------------------------|--------|---------------|---|---|
| 4        | DUU 10072 ENTREPRENEURSHIP | 2      | NONE          | <p>ENTREPRENEURSHIP focuses on the fundamentals and concept of entrepreneurship in order to inculcate the value and interest in students to choose entrepreneurship as a career. This course can help students to initiate creative and innovative entrepreneurial ideas. It also emphasizes on online and offline business learning in line with the changing needs of current market.</p> | <p>CLO1:<br/>Demonstrate application on entrepreneurship concept, competencies, importance and social responsibilities of entrepreneurship. (A2,PLO9)</p> <p>CLO2:<br/>Propose sustainable business idea using Business Model Canvas (BMC) for entrepreneurial project. (A3, PLO10)</p> <p>CLO3:<br/>Organize online business using various cyber social tools. (P5, PLO 3)</p> |

| SEMESTER | COURSE                                     | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|--|--------|---------------|--|--|
| 4        | MPU 22071 KURSUS INTEGRITI AND ANTI-RASUAH | 1      | NONE          | KURSUS INTEGRITI DAN ANTI RASUAH (KIAR) merangkumi konsep asas tentang nilai integriti, bentuk perbuatan rasuah dan salah guna kuasa dalam kehidupan seharian serta organisasi dan langkah-langkah pencegahan rasuah | <p>CLO1:<br/>Membincangkan hubungan integriti dan antirasuah dengan isu semasa.<br/>(A2 , PLO8)</p> <p>CLO2:<br/>Menilai bentuk pelakuan rasuah dan salah guna kuasa dalam aktiviti seharian dan organisasi.<br/>(A3, PLO10)</p> |

| SEMESTER | COURSE   | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|--|--------|---------------|---|--|
| 4        | DGP 40392 PROGRAMMING METHOD FOR PROCESS ENGINEERING | 2      | NONE          | <p>PROGRAMMING METHOD FOR PROCESS ENGINEERING introduces students to the essential skills of the Python Programming Language. The course provides knowledge on learning to design, write and run programmes encoded in the Python language. Students' skills are developed through programming exercises in the class, from writing simple functions to developing complete applications.</p> | <p>CLO1:<br/>Apply knowledge of the basic concepts of programming with appropriate examples of language. (C3,PLO1)</p> <p>CLO2:<br/>Manipulate programming language for the assigned Practical Task. (P4,PLO5)</p> <p>CLO3:<br/>Propose complete programming to support the Process Engineering system. (A3,PLO11)</p> |

| SEMESTER | COURSE              | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|---------------------|--------|---------------|---|---|
| 4        | DGP 40402 PROJECT 1 | 2      | NONE          | <p>PROJECT 1 provides knowledge on the implementation methods and project production based on the hardware or analysis from laboratory tests, or research data/information. This course provides exposure to selection and initial project planning, preparation methods, presentation proposals, and production projects. This course also prepares the students with knowledge and training skills in problem-solving and decision-making before going into the nature of employment in the future.</p> | <p>CLO1:<br/>Write project activities in a project proposal. (C3,PLO4)</p> <p>CLO2:<br/>Perform the project tasks in line with the Gantt Chart. (P4,PLO5)</p> <p>CLO3:<br/>Explain the project ideas through a proposal defense using verbal communication skills. (A3,PLO9)</p> <p>CLO4:<br/>Demonstrate the project progress through a presentation using managerial and entrepreneurial skills. (A3,PLO10)</p> |

| SEMESTER | COURSE                          | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|---------------------------------|--------|---------------|---|---|
| 4        | DGP 40413 PETROCHEMICAL POLYMER | 3      | NONE          | <p>PETROCHEMICAL POLYMER focuses on theoretical knowledge of the basic polymer and plastic classifications. The course will also introduce students to the plastic production process. The students will be able to describe the plastic production process and relate it to environmental aspects.</p> | <p>CLO1:<br/>Attain the types of polymer and the method of polymer moulding.<br/>(C3 ,PLO1)</p> <p>CLO2:<br/>Perform process related to petrochemical polymer synthesis.<br/>(P4,PLO5)</p> <p>CLO3:<br/>Discuss the polymer moulding process into useful product.<br/>(A2,PLO9)</p> |

| SEMESTER | COURSE                                     | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|----------|--|--------|---------------|--|---|
| 4        | DGP 40423 PETROCHEMICAL PROCESS TECHNOLOGY | 3      | NONE          | <p>PETROCHEMICAL PROCESS TECHNOLOGY provides exposure to the basic processes involved in oil and gas processing plants in relationship to the petrochemical industry. This course also provides exposure to the various processing technologies carried out in petrochemical plants. The students will be able to learn the processes involved in the production of petrochemical products and thus complete a process flow diagram.</p> | <p>CLO1:<br/>Carry out the principles of separation processes and chemical reactions involved in the plants. (C3, PLO3)</p> <p>CLO2:<br/>Perform appropriate techniques when handling process engineering equipment. (P4, PLO5)</p> <p>CLO3:<br/>Discuss the functions of processing units and the major equipment used in the processing units. (A2, PLO9)</p> |

| SEMESTER | COURSE  | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|----------|---|--------|---------------|--|---|
| 5        | MPU 23182 SAINS TEKNOLOGI DAN KEJURUTERAAN ISLAM* | 2      | NONE          | <p>SAINS, TEKNOLOGI DAN KEJURUTERAAN DALAM ISLAM memberikan pengetahuan tentang konsep Islam sebagai al-Din dan seterusnya membincangkan konsep sains, teknologi dan kejuruteraan dalam Islam serta impaknya, pencapaiannya dalam tamadun islam, prinsip serta peranan syariah dan etika Islam, peranan kaedah fiqh serta aplikasinya.</p> | <p>CLO1:<br/>Melaksanakan amalan Islam dengan betul dalam kehidupan seharian.<br/>(A2, PLO8)</p> <p>CLO2:<br/>Menerangkan etika dan profesionalisme berkaitan sains, teknologi dan kejuruteraan dalam Islam.<br/>(A2, PLO7)</p> <p>CLO3:<br/>Menghubungkait minda ingin tahu dengan prinsip syariah, etika dan kaedah fiqh dalam bidang sains, teknologi dan kejuruteraan menurut perspektif Islam.<br/>(A4, PLO10)</p> |

| SEMESTER | COURSE                                 | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|--|--------|---------------|---|--|
| 3        | MPU 23172 NILAI MASYARAKAT MALAYSIA ** | 2      | NONE          | <p>NILAI MASYARAKAT MALAYSIA disediakan untuk membincangkan aspek sejarah pembentukan masyarakat, nilai-nilai agama, adat resam dan budaya masyarakat di Malaysia. Selain itu, pelajar dapat mempelajari tentang tanggungjawab sebagai individu dan nilai perpaduan dalam kehidupan di samping cabaran-cabaran dalam membentuk masyarakat Malaysia yang bersatu padu dan penyayang.</p> | <p>CLO1:<br/>Membincangkan sejarah dan nilai dalam pembentukan masyarakat di Malaysia. (A2, PLO8)</p> <p>CLO2:<br/>Menerangkan etika dan profesionalisme terhadap konsep perpaduan bagi meningkatkan semangat patriotisme masyarakat Malaysia. (A3, PLO7)</p> <p>CLO3:<br/>Menghubungkan minda ingin tahun dengan cabaran-cabaran dalam membentuk masyarakat Malaysia. (A4, PLO10)</p> |

| SEMESTER | COURSE                        | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|-------------------------------|--------|---------------|---|--|
| 5        | DUE 50082 TECHNICAL ENGLISH 3 | 2      | NONE          | <p>TECHNICAL ENGLISH 3 aims to prepare students to use language skills (listening, reading, speaking and writing) to achieve B2 level in Common European Framework of Reference (CEFR) which is becoming independent language users. It covers skills which are needed by students focusing on self-assessment, job-search strategies, writing and explaining technical text (s) on wide range of technical subjects. Students will be able to select jobs or positions which match their qualifications, retrieve relevant information regarding the positions available and request for a job interview. This course also aims to prepare students with skills to write effective resumes with accompanying cover letters. The second part of this course is divided into three stages which focuses on students' abilities to study different types of technical text (s), plan and prepare clear and detailed technical text (s) and explain the content of technical text (s) using effective presentation skills.</p> | <p>CLO1:<br/>Prepare appropriate types of oral and written communication modes that meet employer's requirements (A4, PLO9)</p> <p>CLO2:<br/>Demonstrate effective language-based skills in interpersonal communication, ethics and workplace related contexts. (A3, PLO11)</p> <p>CLO3:<br/>Organize texts on a wide range of technical subjects to pass information as well as to give reasons in support of or against particular points of views. (A4, PLO9)</p> |

| SEMESTER | COURSE                            | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|-----------------------------------|--------|---------------|---|--|
| 5        | DJJ 30332 ENGINEERING AND SOCIETY | 2      | NONE          | <p>ENGINEERING AND SOCIETY focuses on the introduction to professional ethics, theory and philosophy of ethics, values in professional ethics, engineering bylaws and standards, issues in professional ethics and sustainability. It also relates towards IR 4.0 introduction and green engineering.</p> | <p>CLO1:<br/>Implement the roles of engineering profession towards the developing of society and the challenge of globalization with professional ethic. (C3,PLO7)</p> <p>CLO2:<br/>Determine the importance of engineering management, professional bodies, sustainability and green technology aspect in the engineering profession. (C4,PLO6)</p> <p>CLO3:<br/>Explain the issues of sustainability and green technology in engineering practice. (A3,PLO9)</p> |

| SEMESTER | COURSE              | CREDIT | PRE REQUISITE       | SYNOPSIS   | CLO   |
|----------|---------------------|--------|---------------------|--|---|
| 5        | DGP 50433 PROJECT 2 | 3      | DGP 40402 PROJECT 1 | <p>PROJECT 2 focuses on the methods of construction, testing, detection, and project preparation planned in the previous semester. This course also trains students to prepare project reports accordance with the prescribed format and perform projects throughout the semester.</p> | <p>CLO1:<br/>Document the well-defined project activities through final report.<br/>(C4, PLO4)</p> <p>CLO2:<br/>Perform the project activities using appropriate techniques, resources, engineering, and IT tools to solve well-defined engineering problems.<br/>(P4, PLO5)</p> <p>CLO3:<br/>Explain well-defined project activities effectively using communication skills through final presentation.<br/>(A3, PLO9)</p> <p>CLO4:<br/>Demonstrate project activities on management and finance through final presentation.<br/>(A3, PLO10)</p> |

| SEMESTER | COURSE  | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|---|--------|---------------|---|--|
| 5        | DGP 50443 POLLUTION CONTROL IN PETROCHEMICAL INDUSTRY | 3      | NONE          | <p>POLLUTION CONTROL IN PETROCHEMICALS INDUSTRY emphasizes the fundamentals of environmental pollution such as air, water, solid wastes, and hazardous waste handling in the petrochemicals industry. The students will be exposed to regulations and guidelines related to pollution control and the practical session in the laboratory will also enhance the student's technological literacy skills. This course offers the students the opportunity to demonstrate awareness of sustainability and adhere to environmental quality procedures.</p> | <p>CLO1:<br/>Analyze the impact of environmental pollution in petrochemicals industry. (C4, PLO1)</p> <p>CLO2:<br/>Perform appropriate methods in handling environmental pollution in petrochemicals industry. (P4, PLO5)</p> <p>CLO3:<br/>Demonstrate awareness and consideration to improve quality of environment and maintain sustainability. (A3, PLO6)</p> |

| SEMESTER | COURSE                                       | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|--|--------|---------------|--|--|
| 5        | DGP 50452 PETROCHEMICAL PRODUCTION PROCESSES | 2      | NONE          | <p>PETROCHEMICAL PRODUCTION PROCESSES provide exposure to the basic processes involved in petrochemical processing plant. This course also provides exposure to the various processing technologies carried out in petrochemical plants. The students will be able to learn the processes involved in the production of petrochemical products and thus complete a process flow diagram.</p> | <p>CLO1:<br/>Determine the various processes and reactions involved in the plants. (C4, PLO1)</p> <p>CLO2:<br/>Complete the flow diagrams of the processing plants. (C3, PLO3)</p> <p>CLO3:<br/>Discuss the functions of processing units and major equipment used in the processing units. (A3, PLO9)</p> |

| SEMESTER         | COURSE   | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|------------------|--|--------|---------------|--|---|
| ELECTIVE COURSES | DGP 40463 RENEWABLE AND SUSTAINABLE ENERGY ENGINEERING | 3      | NONE          | <p>RENEWABLE AND SUSTAINABLE ENERGY ENGINEERING focuses on the principles of renewable energy and the sustainability of energy in terms of climate change and economic efficiency. This includes the possible renewable energy technologies such as biomass, ocean, hydropower, geothermal, wind, solar and storage energy. Students should be able to describe the new perspective of renewable energy and its sustainability for future transportation and other applications.</p> | <p>CLO1:<br/>Transcribe the principles of renewable energy and non-renewable energy with their sustainability and environmental impact. (C3, PLO2)</p> <p>CLO2:<br/>Exhibit the alternative of renewable energy with designs of systems, components, processes to meet specified needs with appropriate consideration for sustainability, economics, and environmental considerations. (C3, PLO3)</p> <p>CLO3:<br/>Propose the renewable energy and sustainability of current and future transportation systems. (A3, PLO9)</p> |

| SEMESTER         | COURSE                         | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|------------------|--------------------------------|--------|---------------|--|--|
| ELECTIVE COURSES | DGP 40473 PETROLEUM TECHNOLOGY | 3      | NONE          | <p>PETROLEUM TECHNOLOGY provides knowledge on the concepts and principles of petroleum and its processes. It emphasises the basic methods and techniques in petroleum, covering the following items: petroleum geology, drilling operations, offshore platform production facilities and plant operations.</p> | <p>CLO1:<br/>Carry out the concepts and principles of petroleum geology.<br/>(C3, PLO2)</p> <p>CLO2:<br/>Demonstrate the processes of drilling operations, offshore platform production facilities and plant operations.<br/>(C3, PLO3)</p> <p>CLO3:<br/>Demonstrate the offshore platform production equipment and separation system through presentation skills.<br/>(A2, PLO10)</p> |

| SEMESTER         | COURSE                          | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|------------------|---------------------------------|--------|---------------|---|---|
| ELECTIVE COURSES | DGP 40483 INDUSTRIAL MANAGEMENT | 3      | NONE          | <p>INDUSTRIAL MANAGEMENT provides students with a strong fundamental understanding of industrial management prospects and production system planning such as inventory, scheduling, production system operation, facilities, plant location, layout and line balancing. This course also provides knowledge in quality control and human resource management.</p> | <p>CLO1:<br/>Apply the principles and elements of management concept, quality management and human resources management in the industrial sector. (C3, PLO2)</p> <p>CLO2:<br/>Apply the elements of plant location, layout and line balancing, inventory control management and scheduling management. (C3, PLO3)</p> <p>CLO3:<br/>Describe the quality management practice in the industry. (A3, PLO9)</p> |

| SEMESTER         | COURSE                  | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|------------------|-------------------------|--------|---------------|--|--|
| ELECTIVE COURSES | DGP 40493 UTILITY PLANT | 3      | NONE          | <p>UTILITY PLANT introduces and provides knowledge on different types of utility plant and its importance including utility flow diagrams. It also exposes students to the utility systems and their function, the basic design, the philosophy of control and interlock and the main equipment, functions, mechanical characteristics and operating procedures. This course also imparts general knowledge and exposes the students to common problems in utility plants.</p> | <p>CLO1:<br/>Provide the function and usage of the units involved in each system in the utility plant.<br/>(C3, PLO2)</p> <p>CLO2:<br/>Write the industrial process flow of each system involved in a utility plant.<br/>(C3, PLO3)</p> <p>CLO3:<br/>Explain the effect of the cooling water system on the environment.<br/>(A3, PLO9)</p> |

| SEMESTER         | COURSE                                      | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|------------------|---|--------|---------------|--|---|
| ELECTIVE COURSES | DGP 40503 REACTOR IN PETROCHEMICAL INDUSTRY | 3      | NONE          | <p>REACTOR IN PETROCHEMICALS INDUSTRY provide exposure to the knowledge of the most important types of reactors applied in the petrochemical industry. This course also addresses the characteristics of reactor types. The students will be able to explain the application of reactors in the petrochemicals industry.</p> | <p>CLO1:<br/>Apply various types of reactors in the petrochemicals industry. (C3, PLO2)</p> <p>CLO2:<br/>Employ the characteristics of reactor types use in the petrochemicals industry. (C3, PLO3)</p> <p>CLO3:<br/>Explain independently the application of reactors in the petrochemicals industry. (A3, PLO9)</p> |



# ***DIPLOMA IN CHEMICAL ENGINEERING***



# DIPLOMA IN CHEMICAL ENGINEERING

## INTRODUCTION

The New Industrial Master Plan 2030 (NIMP 2030) targets to build Malaysia's industrial capacity and resilience for long-term and sustainable growth. NIMP 2030 is designed to drive Malaysia's trajectory as a global leader in industrial development, extend the domestic linkages to create wealth across the nation as well as strengthen its position in the global value chain. Three key global trends are; first is leverage mature industrial infrastructure with good connectivity, strategic location and reputation. Second, step up efforts to develop high-skilled talent and enhance TVET programmes. Third, to create new growth opportunities in green manufacturing, electric vehicles, and carbon capture, utilisation, and storage (CCUS). NIMP 2030 missions have been formulated to drive industry transformation at a large scale: to advance economic complexity, to tech up for a digitally vibrant nation, to push for net zero, to safeguard economic security and inclusivity.

The Twelfth Malaysia Plan (12MP) policy improving the educational ecosystem and technical and vocational training (TVET) to develop talent available time the front will be known as the driver changes to meet demand industry better. Industry 4.0 refers to the intelligent networking of machines and processes using information and communication technology (ICT). Industry 4.0 transforms manufacturing processes from product design to fabrication, operation, and maintenance. It fosters automation and data exchange in manufacturing technologies and processes through physical-cyber systems. Industry 4.0, a subset of the 4IR, focuses on the manufacturing sector, whereas 4IR encompasses almost every industry and all aspects of human life.

Diploma in Chemical Engineering for polytechnic is developed to give balance emphasis on theoretical and practical aspects. Thus, to keep abreast with rapid demand in TVET sector, Department of Polytechnic and Community College Education (DPCCE) progressively collaborates with major industry players in the country in developing the curriculum. The Diploma in Chemical Engineering programme will take six semesters to complete, five academic semesters at their respective polytechnics and one semester of industrial training at relevant industries during the final semester. This programme complies with the Malaysian Qualifications Agency (MQA) and Board of Engineer Malaysia (BEM) /Engineering Technology Accreditation Council (ETAC).

## **SYNOPSIS**

The Diploma in Chemical Engineering programme is designed to produce holistic graduates that have knowledge and competent skills in the field of chemical engineering to fulfil the demand of workers in engineering sector. The programme structure focusses on the area of Inorganic and Physical Chemistry, Electrical Technology, Organic Chemistry, Thermodynamics, Material Science, Computer Aided Design, Heat and Mass, Mass and Energy Balance, Fluid Mechanics Transfer, Chemical Process Plant Equipment, Plant Utilities, Unit Operation, Chemical Reaction Engineering, Environmental Quality and Pollution Control, Process Instrumentation and Control and Renewable Energy.

## **JOB PROSPECT**

This programme provides knowledge and skills in Chemical Engineering field that can be applied to a broad range of careers in Chemical Engineering. The knowledge and skills that the students acquire from the programme will enable them to participate in the job market as:

- a. Assistant Engineer
- b. Technical Assistant
- c. Assistant Service Manager
- d. Service Advisor
- e. Supervisor
- f. Technician
- g. Technical Instructor
- h. Technical Sales Executive / Engineer
- i. Lab Assistant
- j. Entrepreneur
- k. Safety Officer
- l. Hygienist

## **PROGRAMME AIMS**

The program believes that every individual has potential and the program aims to develop adaptable and responsible Senior Assistant Chemical Engineers to support government aspiration to increase workforce in engineering related field.

## **PROGRAMME EDUCATIONAL OBJECTIVES (PEO)**

Within a few years after completing Diploma in Chemical Engineering, graduates are able to:

- PEO1 : Proficient with industry-relevant knowledge and skills in chemical engineering field.
- PEO2 : Engaging on lifelong and continuous learning to enhance knowledge and skills.
- PEO3 : Acquire with entrepreneurial skills and mind set in the real working environment.
- PEO4 : Establish links with society and players in the industry .

## **PROGRAMME LEARNING OUTCOMES (PLO)**

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

- PLO1: Apply knowledge of applied mathematics, applied science, engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices in area of chemical engineering.
- PLO2: Identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to chemical engineering field (DK1 to DK4).
- PLO3: Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety as well as, cultural, societal and environmental considerations in area of chemical engineering (DK5).
- PLO4: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements (DK8).
- PLO5: Apply appropriate techniques, resources, and modern engineering computing and IT tools to well-defined engineering problems, with an awareness of the limitations (DK2 and DK6).
- PLO6: Consider sustainable development impacts\* to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving well- defined engineering problems (DK1, DK5 and DK7).
- PLO7: Understand and commit to professional ethics and responsibilities and norms of technician practice and including compliance with national and

international laws. Demonstrate an understanding of the need for diversity and inclusion (DK9).

PL08: Function effectively as an individual, and as a member in diverse and inclusive teams in multi-disciplinary, face-to-face, remote and distributed settings (DK9).

PL09: Communicate effectively and inclusively on well-defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions.

PL10: Demonstrate awareness of engineering management principles as a member or leader in a technical team and to manage projects in multidisciplinary environments.

PL11: Recognise the need for, and have the ability for i) independent and lifelong learning and ii) critical thinking in the face of specialised technical knowledge (DK8).

\*Represented by the 17 UN Sustainable Development Goals (UN-SDG).

### **Notes:**

- DK 1 : A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline and awareness of directly relevant social sciences.
- DK 2 : Procedural mathematics, numerical analysis, statistics applicable in a sub-discipline.
- DK 3 : A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline.
- DK 4 : Engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline.
- DK 5 : Knowledge that supports engineering design and operations based on the techniques and procedures of a practice area.
- DK 6 : Codified practical engineering knowledge in recognised practice area.
- DK 7 : Knowledge of issues and approaches in engineering technician practice, such as public safety and sustainable development.\*
- DK 8 : Engagement with the current technological literature of the practice area.
- DK 9 : Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

## PROGRAMME STRUCTURE (SEM 1- SEM 6)

| COURSE TYPE       | COURSE CODE | COURSE NAME                                     | CONTACT HOURS |   |   |   | CREDIT VALUES | PROGRAMME LEARNING OUTCOME (PLO) |                  |                                 |               |            |                            |        |                                       |                |                                |                    | PREREQUISITE |           |
|-------------------|-------------|---|---------------|---|---|---|---------------|----------------------------------|------------------|---------------------------------|---------------|------------|----------------------------|--------|---------------------------------------|----------------|--------------------------------|--------------------|--------------|-----------|
|                   |             |   | L             | P | T | O |               | PLO1                             | PLO2             | PLO3                            | PLO4          | PLO5       | PLO6                       | PLO7   | PLO8                                  | PLO9           | PLO10                          | PLO11              |              |           |
|                   |             |   |               |   |   |   |               | Engineering Knowledge            | Problem Analysis | Design/Development of Solutions | Investigation | Tool Usage | The Engineer and the World | Ethics | Individual and Collaborative Teamwork | Communications | Project Management and Finance | Life Long Learning |              |           |
| <b>SEMESTER 1</b> |             |   |               |   |   |   |               |                                  |                  |                                 |               |            |                            |        |                                       |                |                                |                    |              |           |
| Compulsory        | DUE10062    | Technical English 1                             | 1             | 0 | 2 | 0 | 2             |                                  |                  |                                 |               |            |                            |        |                                       |                | A3                             | A3                 | A2           |           |
|                   | MPU 24031   | Sukan 1   |               |   |   |   |               |                                  |                  |                                 |               |            |                            |        |                                       |                |                                |                    |              |           |
|                   | MPU 24041   | Kelab / Persatuan 1                             | 0             | 2 | 0 | 0 | 1             |                                  |                  |                                 |               | P2         |                            |        |                                       |                |                                | A3                 |              |           |
|                   | MPU 24XX1   | Unit Beruniform 1                               |               |   |   |   |               |                                  |                  |                                 |               |            |                            |        |                                       |                |                                |                    |              |           |
|                   | MPU22071    | Kursus Integriti dan Anti-Rasuah                | 0             | 0 | 2 | 0 | 1             |                                  |                  |                                 |               |            |                            | A2     |                                       |                | A3                             |                    |              |           |
| Common Core       | DUW10042    | Occupational, Safety and Health for Engineering | 2             | 0 | 0 | 0 | 2             | C2                               |                  |                                 |               | A3         |                            | A3     |                                       |                |                                |                    |              |           |
|                   | DBM10163    | Engineering Mathematics 1                       | 2             | 0 | 2 | 0 | 3             | C3                               | C3               |                                 |               |            |                            |        | A3                                    |                |                                |                    |              |           |
|                   | DBS10042    | Engineering Science                             | 2             | 1 | 0 | 0 | 2             | C3                               |                  |                                 | P3            |            | A3                         |        |                                       |                |                                |                    |              |           |
| Discipline Core   | DGC10113    | Inorganic and Physical Chemistry                | 2             | 2 | 0 | 0 | 3             | C3                               |                  |                                 |               | P3         | A2                         |        |                                       |                |                                |                    |              |           |
|                   | DGP10283    | Electrical Technology                           | 2             | 2 | 0 | 0 | 3             | C3                               |                  |                                 |               | P4         |                            |        | A2                                    |                |                                |                    |              |           |
| <b>TOTAL</b>      |             |   | <b>24</b>     |   |   |   | <b>17</b>     |                                  |                  |                                 |               |            |                            |        |                                       |                |                                |                    |              |           |
| <b>SEMESTER 2</b> |             |   |               |   |   |   |               |                                  |                  |                                 |               |            |                            |        |                                       |                |                                |                    |              |           |
| Compulsory        | MPU21072    | Penghayatan Etika dan Peradaban                 | 1             | 0 | 2 | 0 | 2             |                                  |                  |                                 |               |            |                            | A2     | A2                                    |                | A3                             |                    |              |           |
|                   | MPU 24051   | Sukan 2   |               |   |   |   |               |                                  |                  |                                 |               |            |                            |        |                                       |                |                                |                    | MPU 24031    |           |
|                   | MPU 24061   | Kelab / Persatuan 2                             | 0             | 2 | 0 | 0 | 1             |                                  |                  |                                 |               | P2         |                            |        |                                       |                | A3                             |                    | MPU 24041    |           |
|                   | MPU 24XX1   | Unit Beruniform 2                               |               |   |   |   |               |                                  |                  |                                 |               |            |                            |        |                                       |                |                                |                    |              | MPU 24XX1 |
| Common Core       | DBM20173    | Engineering Mathematics 2                       | 2             | 0 | 2 | 0 | 3             | C3                               | C3               |                                 |               |            |                            |        | A3                                    |                |                                |                    | DBM10163     |           |
| Discipline Core   | DGC20123    | Organic Chemistry                               | 2             | 2 | 0 | 0 | 3             | C3                               |                  |                                 |               | P4         |                            |        | A3                                    |                |                                |                    | DGC10113     |           |
|                   | DGC20133    | Thermodynamics for Chemical Engineering         | 2             | 2 | 0 | 0 | 3             | C3                               | C4               |                                 |               | P4         |                            |        |                                       |                |                                |                    |              |           |
|                   | DGC20143    | Material Science                                | 2             | 2 | 0 | 0 | 3             | C3                               |                  |                                 |               | P4         |                            |        | A3                                    |                |                                |                    |              |           |
|                   | DGM10173    | Engineering Drawing                             | 1             | 3 | 0 | 0 | 3             | C3                               |                  |                                 |               | P3         |                            |        |                                       | A3             |                                |                    |              |           |
| <b>TOTAL</b>      |             |   | <b>25</b>     |   |   |   | <b>18</b>     |                                  |                  |                                 |               |            |                            |        |                                       |                |                                |                    |              |           |
| <b>SEMESTER 3</b> |             |   |               |   |   |   |               |                                  |                  |                                 |               |            |                            |        |                                       |                |                                |                    |              |           |
| Compulsory        | DUE30072    | Technical English 2                             | 1             | 0 | 2 | 0 | 2             |                                  |                  |                                 |               |            |                            |        |                                       |                | A2                             | A3                 | A3           |           |
| Common Core       | DBM30183    | Engineering Mathematics 3                       | 2             | 0 | 2 | 0 | 3             | C3                               | C3               |                                 |               |            |                            |        | A3                                    |                |                                |                    | DBM20173     |           |
|                   | DJJ30332    | Engineering and Society                         | 2             | 0 | 0 | 0 | 2             |                                  |                  |                                 |               |            | C3                         | C4     |                                       | A3             |                                |                    |              |           |
| Discipline Core   | DGC30153    | Heat and Mass Transfer                          | 2             | 2 | 0 | 0 | 3             | C3                               |                  |                                 |               | P4         |                            |        | A3                                    |                |                                |                    | DGC20133     |           |
|                   | DGC30163    | Mass and Energy Balance                         | 3             | 0 | 1 | 0 | 3             | C2                               | C3               |                                 |               |            |                            |        |                                       | A2             |                                |                    | DGC10113     |           |
|                   | DJJ20273    | Fluid Mechanics                                 | 2             | 1 | 1 | 0 | 3             | C2, C3                           |                  |                                 |               | P4         |                            |        |                                       |                |                                |                    |              |           |
| <b>TOTAL</b>      |             |   | <b>21</b>     |   |   |   | <b>16</b>     |                                  |                  |                                 |               |            |                            |        |                                       |                |                                |                    |              |           |

| SEMESTER 4          |           |   |           |   |   |   |           |    |    |    |    |    |    |    |    |    |          |    |
|---------------------|-----------|---|-----------|---|---|---|-----------|----|----|----|----|----|----|----|----|----|----------|----|
| Discipline Core     | DGC40173  | Plant Utilities                             | 2         | 2 | 0 | 0 | 3         | C3 |    |    |    |    | P4 | A3 |    |    |          |    |
|                     | DGC40183  | Unit Operation                              | 2         | 2 | 0 | 0 | 3         |    |    | C3 |    | P4 |    | A3 |    |    |          |    |
|                     | DGC40193  | Chemical Reaction Engineering               | 2         | 2 | 0 | 0 | 3         |    |    | C4 |    | P4 |    | A2 |    |    |          |    |
|                     | DGC40203  | Environmental Quality and Pollution Control | 2         | 2 | 0 | 0 | 3         |    |    |    | C4 | P4 | A3 |    |    |    |          |    |
|                     | DGM40232  | Project 1                                   | 1         | 2 | 0 | 0 | 2         |    |    | C4 | P4 |    |    |    |    | A4 |          |    |
| Electives           | DJXXXX    | Elective***                                 |           |   |   |   | 3         |    |    |    |    |    |    |    |    |    |          |    |
| <b>TOTAL</b>        |           |   | <b>19</b> |   |   |   | <b>17</b> |    |    |    |    |    |    |    |    |    |          |    |
| SEMESTER 5          |           |   |           |   |   |   |           |    |    |    |    |    |    |    |    |    |          |    |
| Compulsory          | MPU23182  | Sains Teknologi dan Kejuruteraan Islam*     | 1         | 0 | 2 | 0 | 2         |    |    |    |    |    |    | A3 | A2 | A4 |          |    |
|                     | MPU23172  | Nilai Masyarakat Malaysia**                 |           |   |   |   |           |    |    |    |    |    |    | A3 | A2 | A4 |          |    |
|                     | DUE50082  | Technical English 3                         | 1         | 0 | 2 | 0 | 2         |    |    |    |    |    |    |    | A4 | A3 |          |    |
|                     | DUU10072  | Entrepreneurship                            | 1         | 2 | 0 | 0 | 2         |    |    |    |    | P2 |    |    | A3 | A3 |          |    |
| Discipline Core     | DGC50213  | Process Instrumentation and Control         | 2         | 2 | 0 | 0 | 3         | C4 |    | P4 |    |    |    |    | A3 |    |          |    |
|                     | DGC50223  | Renewable Energy                            | 2         | 2 | 0 | 0 | 3         |    |    | C4 |    | P4 | A3 |    |    |    |          |    |
|                     | DGM50243  | Project 2                                   | 1         | 4 | 0 | 0 | 3         |    |    | C5 |    | P5 |    |    |    | A5 | DGM40232 |    |
| <b>TOTAL</b>        |           |   | <b>22</b> |   |   |   | <b>15</b> |    |    |    |    |    |    |    |    |    |          |    |
| SEMESTER 6          |           |   |           |   |   |   |           |    |    |    |    |    |    |    |    |    |          |    |
| Industrial Training | DUT600910 | Engineering Industrial Training             | 0         | 0 | 0 | 0 | 10        |    | C3 |    |    |    | P4 | A3 | A5 | P4 | A4       | P4 |
| <b>TOTAL</b>        |           |   | <b>0</b>  |   |   |   | <b>10</b> |    |    |    |    |    |    |    |    |    |          |    |
| ELECTIVES           |           |   |           |   |   |   |           |    |    |    |    |    |    |    |    |    |          |    |
| 1                   | DGC40233  | Polymer Engineering                         | 3         | 0 | 0 | 0 | 3         | C3 | C4 |    |    |    |    |    |    | A3 |          |    |
| 2                   | DGC40243  | Chemical Instrumental Analysis              | 2         | 2 | 0 | 0 | 3         | C3 |    |    |    | P4 |    |    |    |    | A3       |    |
| 3                   | DGC40253  | Computing for Chemical Engineering          | 2         | 2 | 0 | 0 | 3         | C3 |    |    |    | P4 |    |    |    | A3 |          |    |
| 4                   | DGP40473  | Petrokium Technology                        | 3         | 0 | 0 | 0 | 3         |    | C3 | C3 |    |    |    |    |    | A3 |          |    |
| 5                   | DGP20323  | Process Plant Equipment                     | 2         | 2 | 0 | 0 | 3         | C3 |    |    |    | P4 |    |    |    |    | A3       |    |
| FREE ELECTIVES      |           |   |           |   |   |   |           |    |    |    |    |    |    |    |    |    |          |    |
| 1                   | DUD10012  | Design Thinking                             | 1         | 0 | 0 | 1 | 2         |    |    | C3 |    |    |    |    |    | A3 |          |    |

| Course Type            | Total Credit | Total %     |
|------------------------|--------------|-------------|
| i. Compulsory          | 15           | 32%         |
| ii. Common Core        | 15           |             |
| iii. Discipline Core   | 50           | 65%         |
| iv. Specialization     | 0            |             |
| v. Industrial Training | 10           |             |
| vi. Electives          | 3            | 3%          |
| <b>Total Credit</b>    | <b>93</b>    | <b>100%</b> |

| Engineering and Engineering Technology Courses                      |        |           |
|---|--------|-----------|
| Total Credit (Discipline Core, Specialization, Industrial Training) |        | <b>60</b> |
|   | Credit | %         |
| i. Practice - Oriented Components                                   | 31     | 52%       |
| ii. Engineering Technology (Specialization)                         | 0      | 0%        |

## SYNOPSIS AND LEARNING OUTCOMES (CLO) (SEM 1- SEM 6)

| SEMESTER | COURSE                       | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|------------------------------|--------|---------------|---|--|
| 1        | DUE10062 TECHNICAL ENGLISH 1 | 2      | NONE          | <p>TECHNICAL ENGLISH 1 is designed to provide technical students the language input and skills required in technical workplace communication. This course aims to prepare students to use language skills to achieve B2 level which is becoming independent language users. Students will be exposed to skills required for effective participation in group discussions contextualized in workplace safety and health issues. The course also includes input and presentation skills on how to use the language appropriately in describing, comparing, and contrasting objects/ products relevant to students' respective engineering disciplines. The course will enable students to make verbal and written enquiries related to objects/ products for workplace use. The course is also designed to assist students in achieving at least level B1 of Common European Framework of Reference (CEFR).</p> | <p>CLO1:<br/>Discuss work-related topic using effective communication skills by responding to workplace safety and hazards relevant to engineering technician practice. (A2 , PLO11)</p> <p>CLO2:<br/>Explain the features and characteristics of objects/ products used in a well-defined technical activity. (A3 , PLO9)</p> <p>CLO3:<br/>Share effective communication skills in making and responding to enquiries related to a well-defined engineering activities. (A3 , PLO9)</p> |

| SEMESTER | COURSE   | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|--|--------|---------------|--|--|
| 1        | DUW10042 OCCUPATIONAL, SAFETY AND HEALTH FOR ENGINEERING | 2      | NONE          | <p>OCCUPATIONAL SAFETY AND HEALTH FOR ENGINEERING course is designed to impart understanding of the self-regulatory concepts and provisions under the Occupational Safety &amp; Health Act (OSHA) in Malaysia. This course presents the responsibilities of workers in implementing and complying with the safety procedures at work. Understanding of notifications of accidents, dangerous occurrences, poisoning and diseases and liability for offences will be imparted to students. This course will also provide an understanding of the key issues in OSH Management, Incident Prevention, Hazard Identification Risk Control and Risk Assessment (HIRARC), Fire Safety and First Aid, Workplace Environment and Ergonomics and guide the students gradually into this multi-disciplinary science.</p> | <p>CLO1 :<br/>Explain briefly Occupational Safety and Health (OSH) procedures, regulation and its compliance in Malaysia. (C2, PLO1)</p> <p>CLO2 :<br/>Describe hazards, risks and safe work practices in order to maintain health and safe work environment. (A3, PLO4)</p> <p>CLO3 :<br/>Justify the factor that can lead to accident in workplace. (A3, PLO6)</p> |
|          | MPU22071 KURSUS INTEGRITI DAN ANTI RASUAH                | 1      | TIADA         | <p>KURSUS INTEGRITI DAN RASUAH (KIAR) merangkumi konsep asas tentang nilai integriti, bentuk perbuatan rasuah dan salah guna kuasa dalam kehidupan seharian serta organisasi dan langkah-langkah pencegahan rasuah.</p>  | <p>CLO1 :<br/>Membincangkan hubungan nilai integriti dan anti rasuah dengan isu semasa. (A2, PLO8)</p> <p>CLO2 :<br/>Menilai bentuk perlakuan rasuah dan salah guna kuasa dalam aktiviti seharian dan organisasi. (A3, PLO10)</p>  |

| SEMESTER | COURSE                             | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|------------------------------------|--------|---------------|---|---|
| 1        | DBM10163 ENGINEERING MATHEMATICS 1 | 3      | NONE          | <p>ENGINEERING MATHEMATICS 1 exposes students to basic algebra including resolving partial fractions. This course also covers the concept of trigonometry and the method to solve trigonometry problems by using basic identities, compound angle and double angle formulae. Students will be introduced to the theory of complex numbers and the concept of vector and scalar. Students will explore advanced matrices involving a 3x3 matrix.</p> | <p>CLO1 :<br/>Use mathematical statement to describe relationship between various physical phenomenen. (C3 , PLO1)</p> <p>CLO2 :<br/>Show mathematical solutions using the appropriate techniques in mathematics. (C3 , PLO2)</p> <p>CLO3 :<br/>Use mathematical expression in describing real engineering problems precisely, concisely and logically. (A3 , PLO8)</p> |
|          | DBS10042 ENGINEERING SCIENCE       | 2      | NONE          | <p>ENGINEERING SCIENCE course introduces the physical concepts required in engineering disciplines. Students will learn the knowledge of fundamental physics in order to identify and solve engineering physics problems. Students will be able to perform experiments and activities to mastery physics concepts.</p>  | <p>CLO1 :<br/>Use basic physics concept to solve engineering physics problems. (C3 , PLO1)</p> <p>CLO2 :<br/>Use knowlegde of fundamental physics in real engineering activities accurately. (A3 , PLO6)</p> <p>CLO3 :<br/>Perform appropriate activities related to physics concept. (P3 , PLO2)</p>   |

| SEMESTER | COURSE                                    | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|---|--------|---------------|---|--|
| 1        | DGC10113 INORGANIC AND PHYSICAL CHEMISTRY | 3      | NONE          | <p>INORGANIC AND PHYSICAL CHEMISTRY is to introduce students to the fundamentals of Physical Chemistry. The individual modules are concerned with the nature of molecular interactions as well as the description of chemical systems using quantum mechanics and classical thermodynamics.</p>   | <p>CLO1 :<br/>Apply the basic concepts of physical chemistry of solving problems related to chemical analysis process in industry.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Construct laboratory experiments related to inorganic and physical chemistry.<br/>(P3, PLO5)</p> <p>CLO3 :<br/>Discuss engineering problems of societal, health, safety, legal and cultural issues in chemical industry.<br/>(A2 , PLO6)</p> |
|          | DGP10283 ELECTRICAL TECHNOLOGY            | 3      | NONE          | <p>ELECTRICAL TECHNOLOGY exposes students to concepts of basic electrical, electromagnetism and transformers. The course focuses on different types of electrical circuits, the relationship between current and voltage including resistance. It also provides skills in measuring the electrical quantities, constructing basic circuits and operating transformer.</p> | <p>CLO1 :<br/>Apply the basic principles and fundamentals of Electrical Technology to solve electrical circuit problems.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Measures electrical quantities using multimeter in series , parallel and series parallel circuit.<br/>(P4, PLO5)</p> <p>CLO3 :<br/>Perform individual capability in working as a team member to complete the task.<br/>(A2 , PLO8 )</p>                |

| SEMESTER | COURSE                                   | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|----------|--|--------|---------------|--|---|
| 2        | MPU21072 PENGHAYATAN ETIKA DAN PERADABAN | 2      | TIADA         | <p>PENGHAYATAN ETIKA DAN PERADABAN ini menjelaskan tentang konsep etika dari perspektif peradaban yang berbeza. Ini bertujuan bagi mengenalpasti sistem, tahap perkembangan dan perbincangan berkaitan isu-isu kontemporari dalam aspek ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban dapat melahirkan pelajar yang bermoral dan profesional. Penerapan amalan pendidikan berimpak tinggi (HIETs) yang bersesuaian digunakan dalam penyampaian kursus ini.</p>     | <p>CLO1:<br/>Membentangkan konsep etika dan peradaban dalam kepelbagaian tamadun. (A2, PLO7)</p> <p>CLO2:<br/>Menerangkan proses pemeraksanaan kesepaduan sosial merentas bangsa di Malaysia. (A2, PLO8)</p> <p>CLO3:<br/>Mencadangkan sikap yang positif terhadap isu dan cabaran kontemporari dari perspektif etika dan peradaban. (A3, PLO10)</p>  |
|          | DBM20173 ENGINEERING MATHEMATICS 2       | 3      | DBM10163      | <p>ENGINEERING MATHEMATICS 2 exposes students to the basic laws of indices and logarithms. This course introduces the basic rules of differentiation concepts to solve problems that relate to maximum, and minimum and calculate the rates of changes. This course discusses integration concepts in order to strengthen students' knowledge for solving area and volume-bounded region problems. In addition, students will learn the application of both techniques of differentiation and integration.</p> | <p>CLO1:<br/>Explain the relationship between various physical phenomena in algebra and calculus. (C3, PLO1)</p> <p>CLO2:<br/>Solve mathematics problems by using appropriate and relevant fundamentals calculus techniques. (C3, PLO2)</p> <p>CLO3:<br/>Use mathematics language to express mathematics ideas and arguments precisely, concisely and logically in calculus. (A3, PLO8)</p> |

| SEMESTER | COURSE  | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|---|--------|---------------|--|--|
| 2        | DGC20123 ORGANIC CHEMISTRY                      | 3      | DGC10113      | <p>ORGANIC CHEMISTRY discusses the study of organic compounds, beginning with classification by functional groups, the IUPAC system of nomenclature, properties and preparation of organic compounds. Subsequently students study the common types of chemical reactions encountered in organic chemistry.</p>   | <p>CLO1 :<br/>Apply the classification of organic compounds by functional groups, IUPAC nomenclature, the properties and the preparation and reactions of organic compounds.<br/>( C3 , PLO1)</p> <p>CLO2 :<br/>Perform practical skill in organic chemistry laboratory experiment.<br/>( P4, PLO5)</p> <p>CLO3 :<br/>Demonstrate the ability to work individually and in groups to complete assigned tasks during practical work session.<br/>(A3, PLO8 )</p> |
|          | DGC20133 THERMODYNAMIC FOR CHEMICAL ENGINEERING | 3      | NONE          | <p>THERMODYNAMICS FOR CHEMICAL ENGINEERING introduces the concepts of chemical engineering thermodynamics and its application in industries. It emphasizes the basic principle of thermodynamics, properties of pure substances, first law and second law of thermodynamic and phase equilibrium. Besides, it also exposes the students to the demonstration of experiments in Thermodynamics by using real equipment.</p> | <p>CLO1 :<br/>Apply the classification of execute the basic principle of thermodynamic and properties of pure substances in thermodynamics.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Analyze the thermodynamics law and phase equilibrium related to chemical engineering.<br/>(C4, PLO2)</p> <p>CLO3 :<br/>Organize experiments appropriately according to Standard Operating Procedures.<br/>(P4, PLO5 )</p>  |

| SEMESTER | COURSE                       | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|------------------------------|--------|---------------|--|--|
| 2        | DGC20143 MATERIAL SCIENCE    | 3      | NONE          | MATERIAL SCIENCE provides students with an understanding of material science and engineering which emphasizes on atomic and crystal structure, material properties and behavior including material classification and application. Students also apply basic principles of material testing and processing practical work.   | <p>CLO1 :<br/>Apply the fundamental of material science knowledge in engineering field.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Perform experiments related to material science and engineering.<br/>(P4 , PLO5)</p> <p>CLO3 :<br/>Demonstrate the ability to work individually and in group to complete assigned tasks during practical work session.<br/>(A3 , PLO8)</p>   |
|          | DGM10173 ENGINEERING DRAWING | 3      | NONE          | ENGINEERING DRAWING course provides the students with the fundamentals of engineering drawings. It emphasizes on the practical knowledge of drawing instruments and drawing techniques that will be applied in workshop practical activities and in Computer Aided Design courses. Computer Aided Design introduces and provides knowledge to Computer Aided Design (CAD) software application in developing engineering drawing particularly in engineering drawing. This course will enable students to explore the software from its graphical user interface to command features including data entry, draw, modify, display control, drawing aids, layer, block, insert, dimensioning, hatching and plotting. | <p>CLO1 :<br/>Apply the basic fundamentals of engineering drawing and features of CAD software in producing engineering drawing.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Construct the engineering drawing and CAD drawing according to the engineering drawing standards.<br/>(P3 , PLO5)</p> <p>CLO3 :<br/>Propose a project presentation with following engineering norms and practices in engineering drawing.<br/>(A3 , PLO9)</p> |

| SEMESTER | COURSE                       | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|------------------------------|--------|---------------|--|--|
| 3        | DUE30072 TECHNICAL ENGLISH 2 | 2      | NONE          | <p>TECHNICAL ENGLISH 2 equips technical students with the required language skills to communicate effectively at the workplace mainly in describing process and procedures as well as giving instructions. It is also designed to develop students' skills in conducting and participating in meetings and responding appropriately to complaints related to specific situations. This content structure reflects the stated course learning outcomes to be achieved by the students in order to develop their interpersonal &amp; communication skills. It will enable them to independently participate in technical discussion in work-context. This course also aims to prepare students to use language skills to achieve B2 of CEFR level.</p> | <p>CLO1 :<br/>Practice effective oral presentation skills in the context of process, procedure and instruction in workplace situations using appropriate language.<br/>(A2, PLO9)</p> <p>CLO2 :<br/>Demonstrate effective communication and social skills in conducting and participating in meetings in workplace situations.<br/>(A3, PLO9)</p> <p>CLO3 :<br/>Propose appropriate response(s) to complaints related to workplace situations.<br/>(A3, PLO11)</p> |

| SEMESTER | COURSE                           | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|----------------------------------|--------|---------------|---|---|
| 3        | DJJ30332 ENGINEERING AND SOCIETY | 2      | NONE          | <p>ENGINEERING AND SOCIETY focuses on the introduction to professional ethics, theory and philosophy of ethics, values in professional ethics, engineering bylaws and standards, issues in professional ethics and sustainability. It also relates towards IR 4.0 introduction and green engineering.</p> | <p>CLO1 :<br/>Implement the roles of engineering profession towards the developing of society and the challenge of globalization with professional ethic. (C3 , PLO7)</p> <p>CLO2 :<br/>Determine the importance of engineering management, professional bodies, sustainability and green technology aspect in the engineering profession. (C4, PLO6)</p> <p>CLO3 :<br/>Explain the issues of sustainability and green technology in engineering practice. (A3, PLO9)</p> |

| SEMESTER | COURSE                             | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|------------------------------------|--------|---------------|---|---|
| 3        | DBM30183 ENGINEERING MATHEMATICS 3 | 3      | DBM20173      | <p>ENGINEERING MATHEMATICS 3 exposes students to statistical and probability concepts and their applications in interpreting data. The course also introduces the numerical methods concept to solve simultaneous equations by using the Gaussian Elimination method, LU Decomposition using Doolittle and Crout methods, polynomial problems using Simple Fixed-Point Iteration and Newton-Raphson methods. To strengthen the students in solving engineering problems, Ordinary Differential Equation (ODE) is also included. In addition, the course also discusses optimization problems by using Linear Programming. It is designed to build students' teamwork and problems solving skills.</p> | <p>CLO1:<br/>Demonstrate mathematical concepts, formulate methods of solutions and select appropriate techniques for solving routine mathematics problems. (C3, PLO1)</p> <p>CLO2:<br/>Apply mathematical methods and concepts to solve engineering problem. (C3, PLO2)</p> <p>CLO3:<br/>Express mathematics ideas clearly by using correct mathematical terminology and proper mathematical notation. (A3, PLO8)</p> |

| SEMESTER | COURSE                          | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|---------------------------------|--------|---------------|---|---|
| 3        | DGC30153 HEAT AND MASS TRANSFER | 3      | DGC20133      | <p>HEAT AND MASS TRANSFER emphasize on the principles of the Heat Transfer in steady state by conduction, convection and radiation. Principles of steady-state heat conduction in solid are investigated. Students will be exposed to laminar and turbulent boundary layer flow treatment, as well as radiation heat transfer between surfaces. Students will be exposed to the procedure for general problem solving and its application on heat exchanger. Students will be also exposed to the mass transfer mechanisms and develop relations for mass transfer rate for situations commonly encountered in practice, mechanisms and develop relations for mass transfer rate for situations commonly encountered in practice.</p> | <p>CLO1:<br/>Apply the engineering principles to solve engineering calculation for problems involving heat and mass transfer in steady state condition. (C3, PLO1)</p> <p>CLO2:<br/>Perform experiments related to heat and mass transfer systems according to standard operating procedures. (P4, PLO5)</p> <p>CLO3:<br/>Demonstrate the ability to work in team to complete assigned task using knowledge of heat and mass transfer. (A3, PLO8)</p> |

| SEMESTER | COURSE                           | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|----------------------------------|--------|---------------|--|--|
| 3        | DGC30163 MASS AND ENERGY BALANCE | 3      | DGC10113      | <p>MASS AND ENERGY BALANCE is designed as an introduction to fundamentals of material and energy balance. It emphasizes on the understanding of principles in material and energy balance involved in any chemical processes. This course will develop students' ability to formulate and solve material and energy balance problems for chemical process systems.</p>   | <p>CLO1:<br/>Discuss basic principle engineering calculation involving material and energy balances in engineering process systems.<br/>(C2, PLO1)</p> <p>CLO2:<br/>Apply material and energy balances involved in processes with or without chemical reaction in chemical process systems.<br/>(C3, PLO2)</p> <p>CLO3:<br/>Present skills of communication effectively on the principles and techniques of solving problems involving material and energy.<br/>(A2, PLO9)</p> |
|          | DJJ20273 FLUID MECHANICS         | 3      | NONE          | <p>FLUID MECHANICS is designed to provide students with the knowledge related to the fundamentals of fluid mechanics. It emphasized on the principles related to the fluid properties and behavior in static and dynamic condition. This course also covers the principle and application of fluid mechanics laboratory techniques including preparation and analysis of fluid properties, Reynold Numbers, Bernoulli Theorem and losses in pipeline system.</p> | <p>CLO1:<br/>Explain various fluid properties to solve the problems in fluids mechanics.<br/>(C2, PLO1)</p> <p>CLO2:<br/>Apply fundamental knowledge of fluids mechanics in mechanical engineering applications.<br/>(C3, PLO1)</p> <p>CLO3:<br/>Organize appropriate experiments in groups according to the standard operating procedures.<br/>(P4, PLO5)</p>   |

| SEMESTER | COURSE                   | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|--------------------------|--------|---------------|---|---|
| 4        | DGC40173 PLANT UTILITIES | 3      | NONE          | <p>PLANT UTILITIES introduce and provides knowledge on different types of plant and its importance including various utility flow diagrams. It also exposes students to utility system and its functions, calculations, the basic design, the main equipment involved, functions, mechanical characteristics and its operating procedures. During this course, the students will also be exposed to practical skills regarding utility plant operations and maintenance through practical works.</p>  | <p>CLO1:<br/>Acquire the knowledge on the function, process flow and basic calculation involved in utility plant system.<br/>(C3, PLO1)</p> <p>CLO2:<br/>Perform practical tasks relating to utility plant operation.<br/>(P4, PLO5)</p> <p>CLO3:<br/>Demonstrate societal awareness towards sustainable management of environment.<br/>(A3, PLO6)</p>  |
|          | DGC40183 UNIT OPERATION  | 3      | NONE          | <p>UNIT OPERATION provides knowledge regarding the equipment or process unit as well as its function use in the industry. The unit operations are largely used to conduct the primarily physical steps of preparing the reactants, separating and purifying the products, recycling unconverted reactants and controlling the energy transfer into or out of the chemical reactor. This course exposes the concepts and methods for the separation process of solids, liquids and gases. Therefore, it will emphasize in various unit operations, namely drying, crystallization, filtration, evaporation, distillation, absorption, adsorption and extraction. By completing the course, the student will understand the basic mechanisms of the unit operations in chemical engineering fields and will be able to make a selection of the most suitable unit to be used in a process depending on certain factors.</p> | <p>CLO1:<br/>Apply the principles and methods of separation process in unit operation to solve related problem based on its application and functions.<br/>(C3, PLO3)</p> <p>CLO2:<br/>Perform experiments related to unit operation according to standard operating procedures.<br/>(P4, PLO5)</p> <p>CLO3:<br/>Demonstrate ability to work in team to complete assigned tasks.<br/>(A3, PLO8)</p> |

| SEMESTER | COURSE   | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|--|--------|---------------|---|--|
| 4        | DGC40193 CHEMICAL REACTION ENGINEERING             | 3      | NONE          | <p>CHEMICAL REACTION ENGINEERING gives exposure to the basic principles of batch reactor, continuous stirred tank reactor (CSTR), plug flow reactor (PFR), and reactors in series. This course covers the fundamentals of chemical kinetics and reactor design. It includes the conversion and sizing of chemical reactors, rate laws, and stoichiometric table. This course discusses the design structure of isothermal reactors as well as develops an understanding of catalysts and catalytic reactions.</p>   | <p>CLO1:<br/>Discover the theories, principles and specific equations in the basic calculation of the reactors design in chemical reaction engineering. (C4 , PLO3)</p> <p>CLO2:<br/>Perform the principles of chemical reaction engineering by doing practical tasks on the isothermal and adiabatic reactor. (P4, PLO5)</p> <p>CLO3:<br/>Practise the fundamentals of chemical reaction engineering principles ethical. (A2, PLO7)</p>       |
|          | DGC40203 ENVIRONMENT QUALITY AND POLLUTION CONTROL | 3      | NONE          | <p>ENVIRONMENTAL QUALITY AND POLLUTION CONTROL provides knowledge that equip students to have a clear view of environmental engineering which includes water and waste water quality, air and noise pollution control, solid and hazardous waste treatment technology, environmental management and the regulation. The course will also be focusing on the practical skills for various methods of water quality testing, pollution control methods including the on-site sampling. By completing the course, the students will understand and contribute for the effective responsibility towards a sustainable development nation.</p> | <p>CLO1:<br/>Analyze the environmental engineering and management knowledge with the associated problems based on the current regulations and standard clearly. (C4 , PLO4)</p> <p>CLO2:<br/>Perform experiments related to environmental quality methods appropriately. (P4, PLO5)</p> <p>CLO3:<br/>Demonstrate waste minimisation and pollution issues critically towards achieving sustainable environment responsibilities. (A3, PLO6)</p> |

| SEMESTER | COURSE  | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|----------|---|--------|---------------|--|---|
| 4        | DGM40232 PROJECT 1                              | 2      | NONE          | <p>PROJECT 1 introduces students with the ability and skills in planning and managing an innovative solution based on their engineering research areas. It also provides students with writing technical proposal and presentation skills. Under the supervision, this course exposes the students with the ability to show a professional attitude regarding time planning, collaboration, integrate between theoretical and practical knowledge.</p> | <p>CLO1:<br/>Document an effective technical project proposal to solve well defined problems in the related engineering field. (C4, PLO3)</p> <p>CLO2:<br/>Organize an investigation of well-defined problems to provide an innovative and creative solutions for selected engineering research project. (P4, PLO4)</p> <p>CLO3:<br/>Relate knowledge and developed skills to manage the project. (A4, PLO10)</p> |
| 5        | MPU23182 SAINS TEKNOLOGI DAN KEJURUTERAAN ISLAM | 2      | NONE          | <p>SAINS TEKNOLOGI DAN KEJURUTERAAN ISLAM memberi pengetahuan tentang konsep islam sebagai al-Din dan seterusnya membincangkan konsep sains, teknologi dan kejuruteraan dalam islam serta impaknya, pencapaiannya dalam tamadun islam, prinsip serta peranan syariah dan etika islam, peranan kaedah fiqh serta aplikasinya.</p>   | <p>CLO1:<br/>Melaksanakan amalan islam dengan betul dalam kehidupan seharian. (A2, PLO8)</p> <p>CLO2:<br/>Menerangkan etika dan profesionalisme berkaitan sains teknologi dan kejuruteraan dalam islam. (A3, PLO7)</p> <p>CLO3:<br/>Menghubunkait minda ingin tahu dengan prinsip syariah, etika dan kaedah fiqh dalam bidang sains,teknologi dan kejuruteraan menurut perspektif islam. (A4, PLO10)</p>          |

| SEMESTER | COURSE                             | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|------------------------------------|--------|---------------|---|---|
| 5        | MPU23172 NILAI MASYARAKAT MALAYSIA | 2      | NONE          | <p>NILAI MASYARAKAT MALAYSIA disediakan untuk membincangkan aspek sejarah pembentukan masyarakat, nilai-nilai agama, adat resam budaya masyarakat di Malaysia. Selain itu, pelajar dapat mempelajari tentang tanggungjawab sebagai individu dan nilai perpaduan dalam kehidupan di samping cabaran-cabaran dalam membentuk masyarakat Malaysia yang bersatupadu dan penyayang.</p>          | <p>CLO1:<br/>Membincangkan sejarah dan nilai dalam pembentukan masyarakat di Malaysia.<br/>(A2, PLO8)</p> <p>CLO2:<br/>Menerangkan etika dan profesioanlisme terhadap konsep perpaduan bagi meningkatkan semangat patriotisme masyarakat Malaysia.<br/>(A3, PLO7)</p> <p>CLO3:<br/>Menghubunkait minda ingin tahu dengan cabaran-cabaran dalam membentuk masyarakat Malaysia.<br/>(A4, PLO10)</p> |
|          | DUU10072 ENTREPRENUERSHIP          | 2      | NONE          | <p>ENTREPRENEURSHIP focuses on the fundamentals and concept of entrepreneurship in order to inculcate the value and interest in students to choose entrepreneurship as a career. This course can help students to initiate creative and innovative entrepreneurial ideas. It also emphasizes on online and offline business learning in line with the changing needs of current market.</p> | <p>CLO1:<br/>Demonstrate application on entrepreneurship concept, competencies, importance and social responsibilities of entrepreneurship.<br/>(A2, PLO9)</p> <p>CLO2:<br/>Propose sustainable business idea using Business Model Canvas (BMC) for entrepreneurial project.<br/>(A3, PLO10)</p> <p>CLO3:<br/>Organize online business using various cyber social tools.<br/>(P5, PLO3)</p>       |

| SEMESTER | COURSE                       | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|------------------------------|--------|---------------|---|--|
| 5        | DUE50082 TECHNICAL ENGLISH 3 | 2      | NONE          | <p>TECHNICAL ENGLISH 3 aims to prepare students to use language skills (listening, reading, speaking and writing) to achieve B2 level in Common European Framework of Reference (CEFR) which is becoming independent language users. It covers skills which are needed by students focusing on self-assessment, job-search strategies, writing and explaining technical text (s) on wide range of technical subjects. Students will be able to select jobs or positions which match their qualifications, retrieve relevant information regarding the positions available and request for a job interview. This course also aims to prepare students with skills to write effective resumes with accompanying cover letters. The second part of this course is divided into three stages which focuses on students' abilities to study different types of technical text (s), plan and prepare clear and detailed technical text (s) and explain the content of technical text (s) using effective presentation skills.</p> | <p>CLO1:<br/>Prepare appropriate types of oral and written communication modes that meet employer's requirements. (A3, PLO9)</p> <p>CLO2:<br/>Demonstrate effective language-based skills in interpersonal communication, ethics and workplace related contexts. (A3, PLO11)</p> <p>CLO3:<br/>Organize texts on a wide range of technical subjects to pass information as well as to give reasons in support of or against particular points of view. (A4, PLO9)</p> |

| SEMESTER | COURSE                                       | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|--|--------|---------------|--|--|
| 5        | DGC50213 PROCESS INSTRUMENTATION AND CONTROL | 3      | NONE          | <p>PROCESS INSTRUMENTATION AND CONTROL provides knowledge about measurement equipment used in the industry, understanding basic principles and the job lists of instruments. The course will expose students with the basic theory, construction, operation and the usage of pneumatic equipment, control valve, transmitter, converter and controller. The students will also be provided with the basic principle for control system and its usage according to petrochemical plant situation.</p> | <p>CLO1:<br/>Determine the fundamental of process control system, measurement and working principle of instrumentation used in a process plant. (C4, PLO2)</p> <p>CLO2:<br/>Perform the measurement and basic process control system applied in a process plant. (P4, PLO4)</p> <p>CLO3:<br/>Demonstrate good communication through practical work in a group within a stipulated time frame. (A3, PLO9)</p> |
|          | DGC50223 RENEWABLE ENERGY                    | 3      | NONE          | <p>RENEWABLE ENERGY explore the central concepts of renewable energy and sustainability, with a particular focus on renewable energy systems. This course will also introduce students to a range of renewable energy technologies, such as solar thermal, wind energy, hydropower and biomass energy. Finally, students will explore the potential and differences among the various available renewable energy sources.</p>  | <p>CLO1:<br/>Analyze the principles of renewable energy to solve related problem based on its application and challenges. (C4, PLO3)</p> <p>CLO2:<br/>Perform practical task related to renewable energy. (P4, PLO5)</p> <p>CLO3:<br/>Display good problem solving skill related to the social and environmental benefits of renewable energy. (A3, PLO6)</p>  |

| SEMESTER   | COURSE                        | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|------------|-------------------------------|--------|---------------|--|---|
| 5          | DGM50243 PROJECT 2            | 3      | DGM40232      | PROJECT 2 is a continuation of Project 1, focusing on developing the student's research engineering skills to be a professional level and provides the opportunity to collaborate with industries and research organizations for an innovative solution. This course enhances student's ability and skills pertaining to technical writing and presentation. | <p>CLO1:<br/>Validate solution to solve specified engineering problems in producing technical report accordance to the standard forma.<br/>(C4, PLO3)</p> <p>CLO2:<br/>Organizes project development process using appropriate techniques, resources, modern engineering and IT tools.<br/>(P5, PLO5)</p> <p>CLO3:<br/>Manage an effective presentation that consists of project activities and outcomes.<br/>(A5, PLO10)</p> |
| ELECTIVE S | DGC-40233 POLYMER ENGINEERING | 3      | NONE          | POLYMER ENGINEERING discusses various aspects related to polymer. Students will be introduced to the basic concept of polymer, polymerization and the properties of polymer. Some aspects in polymer process in industry is explained starting from the additives material in polymer, types of polymer materials, and the method of polymer processing.     | <p>CLO1:<br/>Apply the knowledge of polymer, polymerization and its properties.<br/>(C3, PLO1)</p> <p>CLO2:<br/>Analyze the polymer according to its additive, types and processes.<br/>(C4, PLO2)</p> <p>CLO3:<br/>Demonstrate skills of communication effectively on well-defined engineering activities in polymer industries process.<br/>(A3, PLO9)</p>  |

| SEMESTER   | COURSE                                      | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|------------|---|--------|---------------|--|--|
| ELECTIVE S | DGC40243 CHEMICAL INSTRUMENTAL ANALYSIS     | 3      | NONE          | <p>CHEMICAL INSTRUMENTAL ANALYSIS introduces the application of analytical techniques to determine the chemical composition and properties of substances. Chemical instrumental analysis encompasses a wide range of methods, each designed to address specific analytical needs. These methods involve the use of sophisticated instruments that can measure physical and chemical properties of substances with high accuracy and precision. Some of the commonly employed techniques in chemical instrumental analysis include spectroscopy, chromatography and microscopy. This course familiarizes the students on major instruments used in the sample analysis.</p> | <p>CLO1:<br/>Utilize the techniques, general principles and instruments in various chemical instrumental analysis situations. (C3, PLO1)</p> <p>CLO2:<br/>Perform practical skills and techniques in conducting chemical analysis in laboratory. (P4, PLO5)</p> <p>CLO3:<br/>Demonstrate lifelong learning skills while conducting the practical work. (A5, PLO11)</p> |
|            | DGC40253 COMPUTING FOR CHEMICAL ENGINEERING | 3      | NONE          | <p>COMPUTING FOR CHEMICAL ENGINEERING explores the application of computing tools in solving problems. This subject consists of two parts; one part focusing on spreadsheet software and the other on programming language. Both parts aim to equip students with computational skills and techniques necessary for analyzing, modeling, and optimizing chemical engineering processes.</p>  | <p>CLO1:<br/>Apply knowledge of computing in real life application. (C3, PLO1)</p> <p>CLO2:<br/>Build computational skills in solving engineering problems. (P4, PLO5)</p> <p>CLO3:<br/>Demonstrate an effective communication in delivering solution for engineering problems. (A3, PLO9)</p>   |

| SEMESTER   | COURSE                           | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|------------|----------------------------------|--------|---------------|---|---|
| ELECTIVE S | DGP40473 PETROLEUM TECHNOLOGY    | 3      | NONE          | <p>PETROLEUM TECHNOLOGY provides knowledge on the concepts and principles of petroleum and its processes. It emphasises the basic methods and techniques in petroleum, covering the following items: petroleum geology, drilling operations, offshore platform production facilities and plant operations.</p>  | <p>CLO1:<br/>Carry out the concepts and principles of petroleum geology.<br/>(C3, PLO2)</p> <p>CLO2:<br/>Demonstrate the processes of drilling operations, offshore platform production facilities and plant operations.<br/>(C3, PLO3)</p> <p>CLO3:<br/>Demonstrate the offshore platform production equipment and separation system through presentation skills.<br/>(A3, PLO9)</p>   |
|            | DGP20323 PROCESS PLANT EQUIPMENT | 3      | NONE          | <p>PROCESS PLANT EQUIPMENT provides knowledge on the concepts and basic principles of plant static and rotary equipment. The course emphasizes the general uses and basic operating principles of static and rotary equipment such as valves, pipes, furnaces, boilers, heat exchangers, pumps, compressor, turbines and internal combustion engine. Students will be introduced to the classifications, types and specific functions of the stated components above.</p> | <p>CLO1:<br/>Apply process plant equipment according to its classification, types, application and operating principle.<br/>(C3, PLO1)</p> <p>CLO2:<br/>Perform proper procedures in operating and maintaining process plant equipment according to standard operating procedure.<br/>(P4, PLO5)</p> <p>CLO3:<br/>Demonstrate specific process plant equipment according to their functions and operating principle in a process plant.<br/>(A3, PLO11)</p> |

| SEMESTER        | COURSE                   | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|-----------------|--------------------------|--------|---------------|---|--|
| FREE ELECTIVE S | DUD10012 DESIGN THINKING | 2      | NONE          | <p>DESIGN THINKING offers the basic concept of design thinking through active experiential learning. Students learn the five iterative phases of design thinking, which are empathy, define, ideate, prototype and testing. Students will apply these design thinking principles, processes and techniques to solve a real-world problem and develop an innovative solution in the form of a product, system or service. Design thinking can also be used as a methodology in product design, software development, business strategy and final year project. It is valued for its ability to foster creativity, collaboration and a user-centric mindset in tackling complex problems.</p> | <p>CLO1:<br/>Apply design thinking principles, processes and techniques to solve a real-world problem innovatively. (C3, PLO3)</p> <p>CLO2:<br/>Propose appropriate solutions to real-world problems by fostering collaborative skills in teamwork. (A3, PLO9)</p> |

| SEMESTER | COURSE                                    | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|---|--------|---------------|---|--|
| 6        | DUT600910 ENGINEERING INDUSTRIAL TRAINING | 10     | NONE          | <p>THE ENGINEERING INDUSTRIAL TRAINING course would provide students with first-hand experience in an engineering-practice environment outside the institution. Students would put into practice prior knowledge and skills, strengthened through industry supervision to acquire higher mastery of engineering essentials and craft skills. Students would also be able to enhance their understanding of the respective job scope requirements, roles in a diversified work environment, professional ethics, and responsibilities, as well as to improve their communication aptitude in performing the tasks, while developing the necessary lifelong learning skills at the workplace.</p> | <p>CLO1:<br/>Perform the assigned task according to the requirements of the job scope.<br/>(P4, PLO5)</p> <p>CLO2:<br/>Explain tasks assigned in the workplace utilizing effective communication skills.<br/>(A4, PLO9)</p> <p>CLO3:<br/>Display ability to work collaboratively and individually based on the given task.<br/>(P4, PLO8)</p> <p>CLO4:<br/>Practice professional ethics and fulfill responsibilities as an engineering technician.<br/>(A5, PLO7)</p> <p>CLO5:<br/>Initiate responsibilities as an engineering technician while adhering to policies, rules, and safety.<br/>(A3, PLO6)</p> <p>CLO6:<br/>Write a report based on the given task, adhering to technical practices.<br/>(C3, PLO2)</p> <p>CLO7:<br/>Demonstrate lifelong learning skills in completing the given task.<br/>(P4, PLO11)</p> |

***DIPLOMA IN MECHANICAL  
ENGINEERING  
(PETROCHEMICAL)***



### INTRODUCTION

The New Industrial Master Plan 2030 (NIMP 2030) targets to build Malaysia's industrial capacity and resilience for long-term and sustainable growth. NIMP 2030 is designed to drive Malaysia's trajectory as a global leader in industrial development, extend the domestic linkages to create wealth across the nation as well as strengthen its position in the global value chain. Three key global trends are; first is leverage mature industrial infrastructure with good connectivity, strategic location and reputation. Second, step up efforts to develop high-skilled talent and enhance TVET programmes. Third, to create new growth opportunities in green manufacturing, electric vehicles, and carbon capture, utilisation, and storage (CCUS). NIMP 2030 missions have been formulated to drive industry transformation at a large scale: to advance economic complexity, to tech up for a digitally vibrant nation, to push for net zero, to safeguard economic security and inclusivity.

The Twelfth Malaysia Plan (12MP) policy improving the educational ecosystem and technical and vocational training (TVET) to develop talent available time the front will be known as the driver changes to meet demand industry better. Industry 4.0 refers to the intelligent networking of machines and processes using information and communication technology (ICT). Industry 4.0 transforms manufacturing processes from product design to fabrication, operation, and maintenance. It fosters automation and data exchange in manufacturing technologies and processes through physical-cyber systems. Industry 4.0, a subset of the 4IR, focuses on the manufacturing sector, whereas 4IR encompasses almost every industry and all aspects of human life.

Diploma in Mechanical Engineering (Petrochemical) for polytechnic is developed to give balance emphasis on theoretical and practical aspects. Thus, to keep abreast with rapid demand in TVET sector, Department of Polytechnic and Community College Education (DPCCE) progressively collaborates with major industry players in the country in developing the curriculum. The Diploma in Mechanical Engineering (Petrochemical) programme will take six semesters to complete, five academic semesters at their respective polytechnics and one semester of industrial training at relevant industries during the final semester. This programme complies with the Malaysian Qualifications Agency (MQA) and Board of Engineer Malaysia (BEM) /Engineering Technology Accreditation Council (ETAC).

## SYNOPSIS

The Diploma in Mechanical Engineering (Petrochemical) programme is designed to produce holistic graduates that have knowledge and competent skills in the field of mechanical engineering to fulfil the demand of workers in engineering sector. The programme structure focuses on the area of Petrochemical Technology, Chemistry, Piping and Instrumentation Control, Material Science, Thermodynamics, Heat Transfer, Static and Rotating Equipment, Fluid Mechanics, Plant Maintenance, Workshop Practices, Pneumatic & Hydraulics and Engineering Drawing.

## JOB PROSPECT

This programme provides the knowledge and skills in Mechanical Engineering field that can be applied to a broad range of careers in Mechanical Engineering, specializing in Petrochemical Engineering. The knowledge and skills that the students acquire from the programme will enable them to participate in the job market as:

- a. Assistant Engineer
- b. Technical Assistant
- c. Assistant Service Manager
- d. Service Advisor
- e. Supervisor
- f. Technician
- g. Technical Instructor
- h. Technical Sales Executive / Engineer
- i. Draughter / Designer Entrepreneur
- j. Adjuster
- k. Product Demonstrator
- l. Fitter
- m. Machinist
- n. Entrepreneur

## PROGRAMME AIMS

The programme believes that every individual has potential, and the programme aims to develop adaptable and responsible Senior Assistant Engineers in Petrochemical Engineering to support government aspiration to increase workforce in engineering related field.

## **PROGRAMME EDUCATIONAL OBJECTIVES (PEO)**

Within a few years after completing Diploma in Mechanical Engineering (Petrochemical), graduates are able to:

- PEO1 : Proficient with industry-relevant knowledge and skills in Mechanical Engineering (Petrochemical) field.
- PEO2 : Engaging on lifelong and continuous learning to enhance knowledge and skills .
- PEO3 : Acquire with entrepreneurial skills and mind set in the real working environment .
- PEO4 : Establish links with society and players in the industry .

## **PROGRAMME LEARNING OUTCOMES (PLO)**

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

- PLO1: Apply knowledge of applied mathematics, applied science, engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices in area of chemical engineering.
- PLO2: Identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to Mechanical Engineering (Petrochemical) field (DK1 to DK4).
- PLO3: Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety as well as, cultural, societal and environmental considerations in area of Mechanical Engineering (Petrochemical) (DK5).
- PLO4: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements (DK8).
- PLO5: Apply appropriate techniques, resources, and modern engineering computing and IT tools to well-defined engineering problems, with an awareness of the limitations (DK2 and DK6).
- PLO6: Consider sustainable development impacts\* to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving well- defined engineering problems (DK1, DK5 and DK7).
- PLO7: Understand and commit to professional ethics and responsibilities and norms of technician practice and including compliance with national and international laws. Demonstrate an understanding of the need for

diversity and inclusion (DK9).

PLO8: Function effectively as an individual, and as a member in diverse and inclusive teams in multi-disciplinary, face-to-face, remote and distributed settings (DK9).

PLO9: Communicate effectively and inclusively on well-defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions.

PLO10: Demonstrate awareness of engineering management principles as a member or leader in a technical team and to manage projects in multidisciplinary environments.

PLO11: Recognise the need for, and have the ability for i) independent and lifelong learning and ii) critical thinking in the face of specialised technical knowledge (DK8).

\*Represented by the 17 UN Sustainable Development Goals (UN-SDG).

**Notes:**

DK 1 :A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline and awareness of directly relevant social sciences.

DK 2 :Procedural mathematics, numerical analysis, statistics applicable in a sub-discipline.

DK 3 :A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline.

DK 4 :Engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline.

DK 5 : Knowledge that supports engineering design and operations based on the techniques and procedures of a practice area.

DK 6 :Codified practical engineering knowledge in recognised practice area.

DK 7 : Knowledge of issues and approaches in engineering technician practice, such as public safety and sustainable development.\*

DK 8 :Engagement with the current technological literature of the practice area.

DK 9 :Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

## PROGRAMME STRUCTURE (SEM 1- SEM 6)

| COURSE TYPE       | COURSE CODE | COURSE NAME                                     | CONTACT HOURS             |   |   | PROGRAMME LEARNING OUTCOME (PLO) |               |                       |                  |                                |            |            |                            |        |                                       |                | PREREQUISITE |                                |                    |    |           |
|-------------------|-------------|---|---------------------------|---|---|----------------------------------|---------------|-----------------------|------------------|--------------------------------|------------|------------|----------------------------|--------|---------------------------------------|----------------|--------------|--------------------------------|--------------------|----|-----------|
|                   |             |   | L                         | P | T | O                                | CREDIT VALUES | PLO1                  | PLO2             | PLO3                           | PLO4       | PLO5       | PLO6                       | PLO7   | PLO8                                  | PLO9           |              | PLO10                          | PLO11              |    |           |
|                   |             |   |                           |   |   |                                  |               | Engineering Knowledge | Problem Analysis | Design/Development of Solution | Innovation | Tool Usage | The Engineer and the World | Ethics | Individual and Collaborative Teamwork | Communications |              | Project Management and Finance | Life Long Learning |    |           |
| <b>SEMESTER 1</b> |             |   |                           |   |   |                                  |               |                       |                  |                                |            |            |                            |        |                                       |                |              |                                |                    |    |           |
| Compulsory        | MPU22071    | Integriti dan Anti-Rasuah                       | 0                         | 0 | 2 | 0                                | 1             |                       |                  |                                |            |            |                            |        |                                       |                |              | A2                             | A3                 |    |           |
|                   | DUE10062    | Technical English 1                             | 1                         | 0 | 2 | 0                                | 2             |                       |                  |                                |            |            |                            |        |                                       |                |              |                                | A3                 | A3 | A2        |
|                   | MPU 2430X1  | Sukan 1   |                           |   |   |                                  |               |                       |                  |                                |            |            |                            |        |                                       |                |              |                                |                    |    | A3        |
|                   | MPU 2430X1  | Kelab / Persatuan 1                             | 0                         | 2 | 0 | 0                                | 1             |                       |                  |                                | P2         |            |                            |        |                                       |                |              |                                |                    |    |           |
|                   | MPU 2430X1  | Unit Bertasfah 1                                |                           |   |   |                                  |               |                       |                  |                                |            |            |                            |        |                                       |                |              |                                |                    |    |           |
| Common Core       | DUIW10042   | Occupational, Safety and Health for Engineering | 2                         | 0 | 0 | 0                                | 2             | C2                    |                  |                                | A3         |            | A3                         |        |                                       |                |              |                                |                    |    |           |
|                   | DRM10163    | Engineering Mathematics 1                       | 2                         | 0 | 2 | 0                                | 3             | C3                    | C3               |                                |            |            |                            |        |                                       |                |              | A3                             |                    |    |           |
|                   | DRS10042    | Engineering Science                             | 2                         | 1 | 0 | 0                                | 2             |                       | C3               |                                | P3         |            | A3                         |        |                                       |                |              |                                |                    |    |           |
| Specialization    | DGM10163    | Chemistry                                       | 2                         | 2 | 0 | 0                                | 3             | C3                    |                  |                                | P3         |            |                            | A3     |                                       |                |              |                                |                    |    |           |
| Discipline Core   | DGM10173    | Engineering Drawing                             | 1                         | 3 | 0 | 0                                | 3             | C3                    |                  |                                |            | P3         |                            |        |                                       |                |              | A3                             |                    |    |           |
| <b>TOTAL</b>      |             |   | <b>22</b>                 |   |   |                                  | <b>17</b>     |                       |                  |                                |            |            |                            |        |                                       |                |              |                                |                    |    |           |
| <b>SEMESTER 2</b> |             |   |                           |   |   |                                  |               |                       |                  |                                |            |            |                            |        |                                       |                |              |                                |                    |    |           |
| Compulsory        | MPU21072    | Penghayatan Etika dan Peradaban                 | 1                         | 0 | 2 | 0                                | 2             |                       |                  |                                |            |            |                            |        |                                       |                |              | A2                             | A2                 | A3 |           |
|                   | MPU 2430X1  | Sukan 2   |                           |   |   |                                  |               |                       |                  |                                |            |            |                            |        |                                       |                |              |                                |                    |    | MPU 24031 |
|                   | MPU 2430X1  | Kelab / Persatuan 2                             | 0                         | 2 | 0 | 0                                | 1             |                       |                  |                                | P2         |            |                            |        |                                       |                |              |                                |                    | A3 | MPU 24041 |
|                   | MPU 2430X1  | Unit Bertasfah 2                                |                           |   |   |                                  |               |                       |                  |                                |            |            |                            |        |                                       |                |              |                                |                    |    | MPU 240X1 |
|                   | Common Core | DRM20173  | Engineering Mathematics 2 | 2 | 0 | 2                                | 0             | 3                     | C3               | C3                             |            |            |                            |        |                                       |                |              |                                | A3                 |    |           |
| Discipline Core   | DIJ10232    | Mechanical Workshop Practice 1                  | 0                         | 4 | 0 | 0                                | 2             |                       |                  |                                | P1,P4      |            | A3                         |        |                                       |                |              |                                |                    |    |           |
|                   | DIJ20263    | Electrical and Electronic Technology            | 2                         | 1 | 1 | 0                                | 3             | C3                    |                  |                                | P4         |            |                            |        |                                       |                |              |                                |                    |    | A3        |
|                   | DIJ10243    | Workshop Technology                             | 3                         | 0 | 0 | 0                                | 3             | C3                    |                  |                                |            |            | C3                         |        |                                       |                |              |                                |                    |    | A3        |
| Specialization    | DGM20183    | Petrochemical Technology                        | 2                         | 2 | 0 | 0                                | 3             | C3                    |                  |                                | P3         |            |                            | A2     |                                       |                |              |                                |                    |    | DGM10163  |
| <b>TOTAL</b>      |             |   | <b>24</b>                 |   |   |                                  | <b>17</b>     |                       |                  |                                |            |            |                            |        |                                       |                |              |                                |                    |    |           |
| <b>SEMESTER 3</b> |             |   |                           |   |   |                                  |               |                       |                  |                                |            |            |                            |        |                                       |                |              |                                |                    |    |           |
| Compulsory        | DUE30072    | Technical English 2                             | 1                         | 0 | 2 | 0                                | 2             |                       |                  |                                |            |            |                            |        |                                       |                |              |                                | A2                 | A3 | A3        |
| Common Core       | DRM30183    | Engineering Mathematics 3                       | 2                         | 0 | 2 | 0                                | 3             | C3                    | C3               |                                |            |            |                            |        |                                       |                |              |                                | A3                 |    | DRM20173  |
|                   | DIJ30332    | Engineering and Society                         | 2                         | 0 | 0 | 0                                | 2             |                       |                  |                                |            |            | C3                         | C4     |                                       |                |              |                                | A3                 |    |           |
| Discipline Core   | DIJ20273    | Fluid Mechanics                                 | 2                         | 2 | 0 | 0                                | 3             | C2, C3                |                  |                                |            | P4         |                            |        |                                       |                |              |                                |                    |    |           |
|                   | DGM30192    | Mechanical Workshop Practice 2                  | 0                         | 4 | 0 | 0                                | 2             |                       |                  |                                | P1,P4      |            |                            | A3     |                                       |                |              |                                |                    |    | DIJ10232  |
|                   | DIJ30293    | Thermodynamics                                  | 2                         | 2 | 0 | 0                                | 3             | C3                    | C4               |                                |            | P4         |                            |        |                                       |                |              |                                |                    |    |           |
|                   | DIJ30313    | Engineering Mechanics                           | 2                         | 2 | 0 | 0                                | 3             | C3                    | C4               |                                |            | P4         |                            |        |                                       |                |              |                                |                    |    |           |
| <b>TOTAL</b>      |             |   | <b>25</b>                 |   |   |                                  | <b>18</b>     |                       |                  |                                |            |            |                            |        |                                       |                |              |                                |                    |    |           |

| SEMESTER 4          |           |   |    |   |    |   |    |    |    |    |       |    |    |    |    |          |
|---------------------|-----------|---|----|---|----|---|----|----|----|----|-------|----|----|----|----|----------|
| Discipline Core     | DIJ30323  | Strength of Materials                           | 2  | 2 | 0  | 0 | 3  | C3 |    |    | C4    | P4 |    |    |    |          |
|                     | DIJ40343  | Material Science and Engineering                | 2  | 1 | 1  | 0 | 3  | C3 |    |    | P4    |    | A3 |    |    |          |
|                     | DGM40203  | Heat Transfer                                   | 2  | 2 | 0  | 0 | 3  |    |    | C4 | P4    |    | A4 |    |    |          |
| Specialisation      | DGM40213  | Piping and Instrumentation Control              | 2  | 2 | 0  | 0 | 3  | C3 |    |    | P3    |    | A3 |    |    |          |
|                     | DGM40232  | Project 1                                       | 1  | 2 | 0  | 0 | 2  |    |    | C4 | P4    |    |    | A4 |    |          |
| Electives           | DJJ0000   | Elective***                                     |    |   |    |   | 2  |    |    |    |       |    |    |    |    |          |
| TOTAL               |           |   | 19 |   | 16 |   |    |    |    |    |       |    |    |    |    |          |
| SEMESTER 5          |           |   |    |   |    |   |    |    |    |    |       |    |    |    |    |          |
| Corequisite         | MPU23182  | Sains Teknologi dan Kejarnteraan Islam*         | 1  | 0 | 2  | 0 | 2  |    |    |    |       |    | A3 | A2 |    | A4       |
|                     | MPU23172  | Nilai Masyarakat Malaysia**                     |    |   |    |   |    |    |    |    |       |    | A3 | A2 |    | A4       |
|                     | DUE50082  | Technical English 3                             | 1  | 0 | 2  | 0 | 2  |    |    |    |       |    |    | A4 | A4 | A3       |
|                     | MPU22062  | Entrepreneurship                                | 1  | 0 | 2  | 0 | 2  |    |    |    | P2    |    |    | A3 | A3 |          |
| Specialisation      | DGM50243  | Project 2                                       | 1  | 4 | 0  | 0 | 3  |    |    | C5 | P5    |    |    | A5 |    | DGM40232 |
|                     | DGM50253  | Plant Maintenance                               | 2  | 2 | 0  | 0 | 3  | C3 |    |    | P4    | A3 |    |    |    |          |
|                     | DGM50263  | Static And Rotating Equipment                   | 2  | 2 | 0  | 0 | 3  | C3 |    |    | P4    |    |    | A4 |    |          |
| TOTAL               |           |   | 22 |   | 15 |   |    |    |    |    |       |    |    |    |    |          |
| SEMESTER 6          |           |   |    |   |    |   |    |    |    |    |       |    |    |    |    |          |
| Industrial Training | DUT600910 | Engineering Industrial Training                 | 0  | 0 | 0  | 0 | 10 | C3 |    |    | P4    | A3 | A5 | P4 | A4 | P4       |
| TOTAL               |           |   | 0  |   | 10 |   |    |    |    |    |       |    |    |    |    |          |
| ELECTIVES           |           |   |    |   |    |   |    |    |    |    |       |    |    |    |    |          |
| 1                   | DGM40172  | Pneumatic and Hydraulics                        | 1  | 3 | 0  | 0 | 2  | C3 |    | P4 |       |    | A3 |    |    |          |
| 2                   | DGM50272  | Static And Rotating Equipment Workshop Practice | 0  | 4 | 0  | 0 | 2  |    |    |    | P4/P5 |    | A4 |    |    |          |
| 3                   | DIJ20282  | Computer Aided Design                           | 0  | 4 | 0  | 0 | 2  | C3 |    |    | P4    |    |    | A3 |    |          |
| 4                   | DIJ40432  | Engineering Plant Technology                    | 2  | 0 | 0  | 0 | 2  | C3 |    |    |       |    | C4 | A3 |    |          |
| 5                   | DIJ40472  | Renewable and Sustainable Energy                | 2  | 0 | 0  | 0 | 2  | C3 |    |    |       |    | C4 |    |    | A3       |
| 6                   | DJM40242  | Programmable Logic Control                      | 1  | 2 | 0  | 0 | 2  | C2 | C5 | P6 |       |    |    |    |    |          |
| 7                   | DIJ40352  | Computer Programming                            | 1  | 2 | 0  | 0 | 2  | C3 |    |    | P4    |    |    |    |    | A3       |
| 8                   | DJF52092  | Quality Control                                 | 2  | 0 | 0  | 0 | 2  | C3 | C4 |    |       |    |    | A3 |    |          |
| FREE ELECTIVES      |           |   |    |   |    |   |    |    |    |    |       |    |    |    |    |          |
| 1                   | DUD10012  | Design Thinking                                 | 1  | 0 | 0  | 1 | 2  |    |    | C3 |       |    |    |    | A3 |          |

| <b>Course Type</b>  | <b>Total Credit</b> | <b>Total %</b> |
|---|---------------------|----------------|
| i. Compulsory   | 15                  | 32%            |
| ii. Common Core   | 15                  |                |
| iii. Discipline Core  | 31                  | 33%            |
| iv. Specialization  | 20                  | 22%            |
| v. Industrial Training  | 10                  | 11%            |
| vi. Electives   | 2                   | 2%             |
| <b>Total Credit</b>   | <b>93</b>           | <b>100%</b>    |
| <b>Engineering and Engineering Technology Courses</b>               |                     |                |
| Total Credit (Discipline Core, Specialization, Industrial Training) | <b>61</b>           |                |
|   | <b>Credit</b>       | <b>%</b>       |
| i. Practice - Oriented Components                                   | 30                  | 50%            |
| ii. Engineering Technology (Specialization)                         | 20                  | 33%            |

## SYNOPSIS AND LEARNING OUTCOMES (CLO) (SEM 1- SEM 6)

| SEMESTER | COURSE                       | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|------------------------------|--------|---------------|---|--|
| 1        | DUE10062 TECHNICAL ENGLISH 1 | 2      | NONE          | <p>TECHNICAL ENGLISH 1 is designed to provide technical students the language input and skills required in technical workplace communication. This course aims to prepare students to use language skills to achieve B2 level which is becoming independent language users. Students will be exposed to skills required for effective participation in group discussions contextualized in workplace safety and health issues. The course also includes input and presentation skills on how to use the language appropriately in describing, comparing, and contrasting objects/ products relevant to students' respective engineering disciplines. The course will enable students to make verbal and written enquiries related to objects/ products for workplace use. The course is also designed to assist students in achieving at least level B1 of Common European Framework of Reference (CEFR).</p> | <p>CLO1:<br/>Discuss work-related topic using effective communication skills by responding to workplace safety and hazards relevant to engineering technician practice. (A2 , PLO11)</p> <p>CLO2:<br/>Explain the features and characteristics of objects/ products used in a well-defined technical activity. (A3 , PLO9)</p> <p>CLO3:<br/>Share effective communication skills in making and responding to enquiries related to a well-defined engineering activities. (A3 , PLO9)</p> |

| SEMESTER | COURSE   | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|--|--------|---------------|---|--|
| 1        | DUW10042 OCCUPATIONAL, SAFETY AND HEALTH FOR ENGINEERING | 2      | NONE          | OCCUPATIONAL SAFETY AND HEALTH FOR ENGINEERING course is designed to impart understanding of the self-regulatory concepts and provisions under the Occupational Safety & Health Act (OSHA) in Malaysia. This course presents the responsibilities of workers in implementing and complying with the safety procedures at work. Understanding of notifications of accidents, dangerous occurrences, poisoning and diseases and liability for offences will be imparted to students. This course will also provide an understanding of the key issues in OSH Management, Incident Prevention, Hazard Identification Risk Control and Risk Assessment (HIRARC), Fire Safety and First Aid, Workplace Environment and Ergonomics and guide the students gradually into this multi-disciplinary science. | <p>CLO1 :<br/>Explain briefly Occupational Safety and Health (OSH) procedures, regulation and its compliance in Malaysia.<br/>(C2, PLO1)</p> <p>CLO2 :<br/>Describe hazards, risks and safe work practices in order to maintain health and safe work environment.<br/>(A3, PLO4)</p> <p>CLO3 :<br/>Justify the factor that can lead to accident in workplace.<br/>(A3, PLO6)</p> |
|          | MPU22071 KURSUS INTEGRITI DAN ANTI RASUAH                | 1      | TIADA         | KURSUS INTEGRITI DAN RASUAH (KIAR) merangkumi konsep asas tentang nilai integriti, bentuk perbuatan rasuah dan salah guna kuasa dalam kehidupan seharian serta organisasi dan langkah-langkah pencegahan rasuah.  | <p>CLO1 :<br/>Membincangkan hubungan nilai integriti dan anti rasuah dengan isu semasa.<br/>(A2, PLO8)</p> <p>CLO2 :<br/>Menilai bentuk perlakuan rasuah dan salah guna kuasa dalam aktiviti seharian dan organisasi.<br/>(A3, PLO10)</p>  |

| SEMESTER | COURSE                             | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|------------------------------------|--------|---------------|---|---|
| 1        | DBM10163 ENGINEERING MATHEMATICS 1 | 3      | NONE          | <p>ENGINEERING MATHEMATICS 1 exposes students to basic algebra including resolving partial fractions. This course also covers the concept of trigonometry and the method to solve trigonometry problems by using basic identities, compound angle and double angle formulae. Students will be introduced to the theory of complex numbers and the concept of vector and scalar. Students will explore advanced matrices involving a 3x3 matrix.</p> | <p>CLO1 :<br/>Use mathematical statement to describe relationship between various physical phenomen. (C3 , PLO1)</p> <p>CLO2 :<br/>Show mathematical solutions using the appropriate techniques in mathematics. (C3 , PLO2)</p> <p>CLO3 :<br/>Use mathematical expression in describing real engineering problems precisely, concisely and logically. (A3 , PLO8)</p> |
|          | DBS10042 ENGINEERING SCIENCE       | 2      | NONE          | <p>ENGINEERING SCIENCE course introduces the physical concepts required in engineering disciplines. Students will learn the knowledge of fundamental physics in order to identify and solve engineering physics problems. Students will be able to perform experiments and activities to mastery physics concepts.</p>  | <p>CLO1 :<br/>Use basic physics concept to solve engineering physics problems. (C3 , PLO1)</p> <p>CLO2 :<br/>Use knowlegde of fundamental physics in real engineering activities accurately. (A3 , PLO6)</p> <p>CLO3 :<br/>Perform appropriate activities related to physics concept. (P3 , PLO2)</p>   |

| SEMESTER | COURSE                       | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|------------------------------|--------|---------------|---|---|
| 1        | DGM10163 CHEMISTRY           | 3      | NONE          | <p>CHEMISTRY offers students a comprehensive understanding of the fundamental principles of organic and inorganic chemistry. It focuses on practical skills and real world applications, providing students with the necessary knowledge to analyze chemical reactions and comprehend the behavior of different substances. Through laboratory work and hands-on experiments, students develop critical thinking and problem-solving abilities. It serves as a foundation for further studies in chemistry and related scientific disciplines.</p>  | <p>CLO1 :<br/>Apply the chemistry s in organic and inorganic.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Organize proper laboratory techniques, experimental procedure, the scientific method and problem-solving process skills as used in study of chemistry.<br/>(P3, PLO5)</p> <p>CLO3 :<br/>Demonstrate effectively as a member in organizing practical related to chemistry.<br/>(A3, PLO8)</p>  |
|          | DGM10173 ENGINEERING DRAWING | 3      | NONE          | <p>ENGINEERING DRAWING course provides the students with the fundamentals of engineering drawings. It Emphasizes on the practical knowledge of drawing instruments and drawing techniques that will be applied in workshop practical activities and in Computer Aided Design courses. Computer Aided Design introduces and provides knowledge to Computer Aided Design (CAD) software application in developing engineering drawing particularly in engineering drawing. This course will enable students to explore the software from its graphical user interface to command features including data entry, draw, modify, display control, drawing aids, layer, block, insert, dimensioning, hatching and plotting.</p> | <p>CLO1 :<br/>Apply the basic fundamentals of engineering drawing and features of CAD software in producing engineering drawing.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Construct the engineering drawing and CAD drawing according to the engineering drawing standards.<br/>(P3 , PLO5)</p> <p>CLO3 :<br/>Propose a practical work presentation with following engineering norms and practices in engineering drawing.<br/>(A3 , PLO9)</p> |

| SEMESTER | COURSE                                    | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|----------|---|--------|---------------|--|---|
| 2        | MPIU21072 PENGHAYATAN ETIKA DAN PERADABAN | 2      | TIADA         | <p>PENGHAYATAN ETIKA DAN PERADABAN ini menjelaskan tentang konsep etika dari perspektif peradaban yang berbeza. Ini bertujuan bagi mengenalpasti sistem, tahap perkembangan dan perbahasan berkaitan isu-isu kontemporari dalam aspek ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban dapat melahirkan pelajar yang bermoral dan profesional. Penerapan amalan pendidikan berimpak tinggi (HIEPs) yang bersesuaian digunakan dalam penyampaian kursus ini.</p>       | <p>CLO1:<br/>Membentangkan konsep etika dan peradaban dalam kepelbagaian tamadun. (A2, PLO7)</p> <p>CLO2:<br/>Menerangkan proses pemeraksanaan kesepaduan sosial merentas bangsa di Malaysia. (A2, PLO8)</p> <p>CLO3:<br/>Mencadangkan sikap yang positif terhadap isu dan cabaran kontemporari dari perspektif etika dan peradaban. (A3, PLO10)</p>  |
|          | DBM20173 ENGINEERING MATHEMATICS 2        | 3      | DBM10163      | <p>ENGINEERING MATHEMATICS 2 exposes students to the basic laws of indices and logarithms. This course introduces the basic rules of differentiation concepts to solve problems that relate to maximum, and minimum and calculate the rates of changes. This course discusses integration concepts in order to strengthen students' knowledge for solving area and volume-bounded region problems. In addition, students will learn the application of both techniques of differentiation and integration.</p> | <p>CLO1:<br/>Explain the relationship between various physical phenomena in algebra and calculus. (C3, PLO1)</p> <p>CLO2:<br/>Solve mathematics problems by using appropriate and relevant fundamentals calculus techniques. (C3, PLO2)</p> <p>CLO3:<br/>Use mathematics language to express mathematics ideas and arguments precisely, concisely and logically in calculus. (A3, PLO8)</p> |

| SEMESTER | COURSE  | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|---|--------|---------------|--|--|
| 2        | DJJ10232 MECHANICAL WORKSHOP PRACTICE 1       | 2      | NONE          | <p>MECHANICAL WORKSHOP PRACTICE 1 exposes the students to welding, machining and fitting which involve the use of arc and gas welding machine, lathe machine, drilling machine, grinding, hand tools, marking out tools, measuring and testing tools. Students are also taught to emphasize on safety procedures and cleanliness in the workshop.</p>  | <p>CLO1 :<br/>Measure product using appropriate measurement instruments.<br/>(P3 , PLO5)</p> <p>CLO2 :<br/>Perform fitting, welding and machining works according to Standard Operational Procedure (SOP).<br/>(P4 , PLO5)</p> <p>CLO3 :<br/>Demonstrate an understanding of sustainable development impacts environment and norms of engineering practices according to the workshop safety and health regulation.<br/>(A3 , PLO6)</p>  |
|          | DJJ20263 ELECTRICAL AND ELECTRONIC TECHNOLOGY | 3      | NONE          | <p>ELECTRICAL AND ELECTRONIC TECHNOLOGY exposes students to the basic electrical circuit concept and electronic components, the application of electromagnetism in electrical machine, transformers and usage of renewable energy. The course focuses on the different types of electrical circuit, the relationship between current and voltage including the resistance and function of electronic components. This course also exposes the students to the demonstration of experiments in Electrical and Electronic Engineering.</p> | <p>CLO1 :<br/>Apply fundamental knowledge in electricity, electronic, Electromagnetisms and electrostatics in motor and generator technologies with embedded to automation control systems to solve related problems in electrical technology.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Organize appropriate experiments in groups according to Standard Operating Procedure.<br/>(P4, PLO5)</p> <p>CLO3 :<br/>Demonstrate commitment and responsibility while conducting electrical devices and components-based practical work, while recognizing the importance of independent and lifelong learning, as well as critical thinking.<br/>(A3, PLO11)</p> |

| SEMESTER | COURSE                            | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|-----------------------------------|--------|---------------|---|---|
| 2        | DJJ10243 WORKSHOP TECHNOLOGY      | 3      | NONE          | <p>WORKSHOP TECHNOLOGY provides exposure and knowledge in using and tools, machine operation such as drilling, lathe, milling and computer numerical control. It also covers on gear measurement and inspection welding process in oxy acetylene, Shielded Metal Arc Welding (SMAW), Gas Tungsten Arc Welding (GTAW) and Gas Metal Arc Welding (GMAW).</p>  | <p>CLO1 :<br/>Apply the knowledge of basic mechanical components and equipment, handtools and measuring equipment in workshop technology.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Apply standard practice in operating mechanical tools and component.<br/>(C3 , PLO7)</p> <p>CLO3<br/>Demonstrate continuous learning and information management skills to complete assigned task.<br/>(A3 , PLO11)</p>                     |
|          | DGM20183 PETROCHEMICAL TECHNOLOGY | 3      | DGM10163      | <p>PETROCHEMICAL TECHNOLOGY gives exposure to the basic processes involved in oil and gas processing plant and also petrochemical plants. The course provides basic knowledge of basic petroleum chemistry and basic plant operation. The students will be able to learn the separation processes involved in oil and gas processing and the various processing technology carried out in petrochemical plants.</p> | <p>CLO1 :<br/>Apply the production of petroleum and operation processes in petrochemical plants.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Organize practical related to petroleum chemistry and separation processes in the petrochemical production.<br/>(P3, PLO5)</p> <p>CLO3 :<br/>Contribute effectively as a member in organizing practical related to petroleum chemistry and separation processes.<br/>(A2, PLO8)</p> |

| SEMESTER | COURSE                           | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|----------|----------------------------------|--------|---------------|--|---|
| 3        | DUE30072 TECHNICAL ENGLISH 2     | 2      | NONE          | <p>TECHNICAL ENGLISH 2 equips technical students with the required language skills to communicate effectively at the workplace mainly in describing process and procedures as well as giving instructions. It is also designed to develop students' skills in conducting and participating in meetings and responding appropriately to complaints related to specific situations. This content structure reflects the stated course learning outcomes to be achieved by the students in order to develop their interpersonal &amp; communication skills. It will enable them to independently participate in technical discussion in work-context. This course also aims to prepare students to use language skills to achieve B2 of CEFR level.</p> | <p>CLO1 :<br/>Practice effective oral presentation skills in the context of process, procedure and instruction in workplace situations using appropriate language. (A2 , PLO9)</p> <p>CLO2 :<br/>Demonstrate effective communication and social skills in conducting and participating in meetings in workplace situations. (A3, PLO9)</p> <p>CLO3 :<br/>Propose appropriate response(s) to complaints related to workplace situations. (A3, PLO11)</p>                   |
|          | DJJ30332 ENGINEERING AND SOCIETY | 2      | NONE          | <p>ENGINEERING AND SOCIETY focuses on the introduction to professional ethics, theory and philosophy of ethics, values in professional ethics, engineering bylaws and standards, issues in professional ethics and sustainability. It also relates towards IR 4.0 introduction and green engineering.</p>  | <p>CLO1 :<br/>Implement the roles of engineering profession towards the developing of society and the challenge of globalization with professional ethic. (C3 , PLO7)</p> <p>CLO2 :<br/>Determine the importance of engineering management, professional bodies, sustainability and green technology aspect in the engineering profession. (C4, PLO6)</p> <p>CLO3 :<br/>Explain the issues of sustainability and green technology in engineering practice. (A3, PLO9)</p> |

| SEMESTER | COURSE                             | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|------------------------------------|--------|---------------|---|---|
| 3        | DBM30183 ENGINEERING MATHEMATICS 3 | 3      | DBM20173      | <p>ENGINEERING MATHEMATICS 3 exposes students to statistical and probability concepts and their applications in interpreting data. The course also introduces the numerical methods concept to solve simultaneous equations by using the Gaussian Elimination method, LU Decomposition using Doolittle and Crout methods, polynomial problems using Simple Fixed-Point Iteration and Newton-Raphson methods. To strengthen the students in solving engineering problems, Ordinary Differential Equation (ODE) is also included. In addition, the course also discusses optimization problems by using Linear Programming. It is designed to build students' teamwork and problems solving skills.</p> | <p>CLO1:<br/>Demonstrate mathematical concepts, formulate methods of solutions and select appropriate techniques for solving routine mathematics problems. (C3, PLO1)</p> <p>CLO2:<br/>Apply mathematical methods and concepts to solve engineering problem. (C3, PLO2)</p> <p>CLO3:<br/>Express mathematics ideas clearly by using correct mathematical terminology and proper mathematical notation. (A3, PLO8)</p> |
|          | DJJ30293 THERMODYNAMICS            | 3      | NONE          | <p>THERMODYNAMICS provides knowledge and application of fundamentals concepts to solve problems related to thermodynamics. It emphasizes analyzing the non-flow process, flow process, heat engine, reversed heat engine and vapor power cycle. This course also exposes the students to the demonstration of experiments by using real equipment.</p>  | <p>CLO1 :<br/>Apply the fundamentals concept and properties of pure substances in thermodynamics. (C3 , PLO1)</p> <p>CLO2 :<br/>Analyze the Thermodynamics systems using the laws of thermodynamics. (C4, PLO2)</p> <p>CLO3 :<br/>Organize appropriately experiments according to the Standard Operating Procedures. (P4 , PLO5)</p>  |

| SEMESTER | COURSE                                  | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|---|--------|---------------|---|---|
| 3        | DGM30192 MECHANICAL WORKSHOP PRACTICE 2 | 3      | DJJ10232      | MECHANICAL WORKSHOP PRACTICE 2 exposes the students to the Tungsten Inert Gas (TIG) welding, Metal Inert Gas (MIG) and arc welding machine as well as machining process using lathe and milling machine. Safety procedure practice is heavily emphasized in the workshop.   | <p>CLO1 :<br/>Follow the appropriate safety and practical procedure for welding and lathe machining. (P3 , PLO5)</p> <p>CLO2 :<br/>Perform welding and lathe machining according to safety and Standard Operating Procedure (SOP). (P4 , PLO5)</p> <p>CLO3 :<br/>Display the ability to work as individual and as a member in diverse technical teams. (A3, PLO8)</p> |
|          | DJJ20273 FLUID MECHANICS                | 3      | NONE          | FLUID MECHANICS is designed to provide students with the knowledge related to the fundamentals of fluid mechanics. It emphasized on the principles related to the fluid properties and behavior in static and dynamic condition. This course also covers the principle and application of fluid mechanics laboratory techniques including preparation and analysis of fluid properties, Reynold Numbers, Bernoulli Theorem and losses in pipeline system. | <p>CLO1:<br/>Explain various fluid properties to solve the problems in fluids mechanics. (C2, PLO1)</p> <p>CLO2:<br/>Apply fundamental knowledge of fluids mechanics in mechanical engineering applications. (C3, PLO1)</p> <p>CLO3:<br/>Organize appropriate experiments in groups according to the standard operating procedures. (P4, PLO5)</p>                    |

| SEMESTER | COURSE                                    | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|---|--------|---------------|--|--|
| 4        | DJJ30323 STRENGTH OF MATERIALS            | 3      | NONE          | <p>STRENGTH OF MATERIALS provides knowledge on concepts and calculation of forces on materials, thermal stress, shear force and bending moment, bending stress, shear stress and torsion in shafts. It also deals with the experiments conducted on tensile test, bending moment, shearing force and torsion and deflection.</p>   | <p>CLO1 :<br/>Apply the concepts of strength of materials to solve related problems.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Analyze problems correctly related to strength of materials.<br/>(C4, PLO4)</p> <p>CLO3 :<br/>Organize appropriately experiment in groups according to Standard Operation Procedures.<br/>(P4, PLO5)</p>                   |
|          | DJJ40343 MATERIAL SCIENCE AND ENGINEERING | 3      | NONE          | <p>MATERIALS SCIENCE AND ENGINEERING course is an introduction to students to learn the fundamentals of materials science and engineering (structure, properties, design and performance). The key step in engineering process is selection of materials for the applications. In the course, students will learn about different classifications of materials, atomic structure and bonding, materials properties, phase diagram and processes involved to produce a final product. This includes advanced techniques in metal fabrications such as powder metallurgy and 3D printing technology. Students will also learn to analyze the materials failure in the structure, applications and environments. Laboratory work will be used to perform the testing techniques employed by materials engineers to determine the properties and evaluate the materials tested. In order to cater for Industry 4.0 technology, students will be given case study and examples based on the current trends in materials and applications.</p> | <p>CLO1 :<br/>Apply the knowledge of materials science in engineering applications.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Performed appropriate material testing according to the Standard Operating Procedures.<br/>(P4 , PLO5)</p> <p>CLO3 :<br/>Work individually and collaboratively in group to complete the assigned tasks.<br/>(A3, PLO8)</p> |

| SEMESTER | COURSE                                      | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|---|--------|---------------|---|--|
| 4        | DGM40203 HEAT TRANSFER                      | 3      | NONE          | HEAT TRANSFER emphasizes on the principles of the heat transfer in steady state by conduction, convection and radiation. principles of steady-state and transient heat conduction in solid are investigated. Laminar and turbulent boundary layer flows are treated, as well as condensation and boiling phenomena, thermal radiation, and radiation heat transfer between surfaces. Students will be exposed to the procedure for general problem solving and its application on heat exchanger. | <p>CLO 1 :<br/>Analyze the engineering principles and mechanism of heat transfer in different practical plications. (C4, PLO3)</p> <p>CLO 2 :<br/>Perform experiment related to different concept of heat transfer. (P4, PLO5)</p> <p>CLO 3 :<br/>Build teamwork with knowledge and experience to accomplish ongoing task. (A4, PLO8)</p>  |
|          | DGM40213 PIPING AND INSTRUMENTATION CONTROL | 3      | NONE          | PIPING AND INSTRUMENTATION CONTROL provides knowledge on identifying the common symbols used in process plants and exposes the skill practice in interpreting the piping and instrumentation control used in the industry. Students will understand the principle for control system and its usage according to petrochemical plants process  | <p>CLO1 :<br/>Apply the symbol, process flow diagram and control system in piping and instrumentation control in process plant operation. (C3, PLO1)</p> <p>CLO2 :<br/>Organizes measurement on plant operation process using piping and instrumentation control. (P3, PLO5)</p> <p>CLO3 :<br/>Organizes measurement on plant operation process using piping and instrumentation control. (A4, PLO8)</p> |

| SEMESTER | COURSE  | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|----------|---|--------|---------------|--|--|
| 4        | DGM40232 PROJECT 1                              | 2      | NONE          | <p>PROJECT 1 introduces students with the ability and skills in planning and managing an innovative solution based on their engineering research areas. It also provides students with writing technical proposal and presentation skills. Under the supervision, this course exposes the students with the ability to show a professional attitude regarding time planning, collaboration, integrate between theoretical and practical knowledge.</p> | <p>CLO1:<br/>Document an effective technical project proposal to solve welldefined problems in the related engineering field. (C4, PLO3)</p> <p>CLO2:<br/>Organize an investigation of well-defined problems to provide an innovative and creative solutions for selected engineering research project. (P4, PLO4)</p> <p>CLO3:<br/>Relate knowledge and developed skills to manage the project. (A4, PLO10)</p> |
| 5        | MPU23182 SAINS TEKNOLOGI DAN KEJURUTERAAN ISLAM | 2      | NONE          | <p>SAINS TEKNOLOGI DAN KEJURUTERAAN ISLAM memberi pengetahuan tentang konsep islam sebagai al-Din dan seterusnya membincangkan konsep sains, teknologi dan kejuruteraan dalam islam serta impaknya, pencapaiannya dalam tamadun islam, prinsip serta peranan syariah dan etika islam, peranan kaedah fiqh serta aplikasinya.</p>   | <p>CLO1:<br/>Melaksanakan amalan islam dengan betul dalam kehidupan seharian. (A2, PLO8)</p> <p>CLO2:<br/>Menerangkan etika dan profesionalisme berkaitan sains teknologi dan kejuruteraan dalam islam. (A3, PLO7)</p> <p>CLO3:<br/>Menghubungkan minda ingin tahu dengan prinsip syariah, etika dan kaedah fiqh dalam bidang sains,teknologi dan kejuruteraan menurut perspektif islam. (A4, PLO10)</p>         |

| SEMESTER | COURSE                             | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|------------------------------------|--------|---------------|---|--|
| 5        | MPU23172 NILAI MASYARAKAT MALAYSIA | 2      | NONE          | <p>NILAI MASYARAKAT MALAYSIA disediakan untuk membincangkan aspek sejarah pembentukan masyarakat, nilai-nilai agama, adat resam budaya masyarakat di Malaysia. Selain itu, pelajar dapat mempelajari tentang tanggungjawab sebagai individu dan nilai perpaduan dalam kehidupan di samping cabaran-cabaran dalam membentuk masyarakat Malaysia yang bersatupadu dan penyayang.</p>          | <p>CLO1:<br/>Membincangkan sejarah dan nilai dalam pembentukan masyarakat di Malaysia. (A2, PLO8)</p> <p>CLO2:<br/>Menerangkan etika dan profesioanlisme terhadap konsep perpaduan bagi meningkatkan semangat patriotisme masyarakat Malaysia. (A3, PLO7)</p> <p>CLO3:<br/>Menghubungkan minda ingin tahu dengan cabaran-cabaran dalam membentuk masyarakat Malaysia. (A4, PLO10))</p> |
|          | DUU10072 ENTREPRENUERSHIP          | 2      | NONE          | <p>ENTREPRENEURSHIP focuses on the fundamentals and concept of entrepreneurship in order to inculcate the value and interest in students to choose entrepreneurship as a career. This course can help students to initiate creative and innovative entrepreneurial ideas. It also emphasizes on online and offline business learning in line with the changing needs of current market.</p> | <p>CLO1:<br/>demonstrate application on entrepreneurship concept, competencies, importance and social responsibilities of entrepreneurship. (A2, PLO9)</p> <p>CLO2:<br/>propose sustainable business idea using Business Model Canvas (BMC) for entrepreneurial project. (A3, PLO10)</p> <p>CLO3:<br/>organize online business using various cyber social tools. (P5, PLO3)</p>        |

| SEMESTER | COURSE                       | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|------------------------------|--------|---------------|---|---|
| 5        | DUE50082 TECHNICAL ENGLISH 3 | 2      | NONE          | <p>TECHNICAL ENGLISH 3 aims to prepare students to use language skills (listening, reading, speaking and writing) to achieve B2 level in Common European Framework of Reference (CEFR) which is becoming independent language users. It covers skills which are needed by students focusing on self-assessment, job-search strategies, writing and explaining technical text (s) on wide range of technical subjects. Students will be able to select jobs or positions which match their qualifications, retrieve relevant information regarding the positions available and request for a job interview. This course also aims to prepare students with skills to write effective resumes with accompanying cover letters. The second part of this course is divided into three stages which focuses on students' abilities to study different types of technical text (s), plan and prepare clear and detailed technical text (s) and explain the content of technical text (s) using effective presentation skills.</p> | <p>CLO1:<br/>Prepare appropriate types of oral and written communication modes that meet employer's requirements.<br/>(A3, PLO9)</p> <p>CLO2:<br/>Demonstrate effective language-based skills in interpersonal communication, ethics and workplace related contexts.<br/>(A3, PLO11)</p> <p>CLO3:<br/>Organize texts on a wide range of technical subjects to pass information as well as to give reasons in support of or against particular points of views.<br/>(A4, PLO9)</p> |

| SEMESTER | COURSE                                 | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO   |
|----------|--|--------|---------------|---|---|
| 5        | DGM50253 PLANT MAINTENANCE             | 3      | NONE          | <p>PLANT MAINTENANCE provides an understanding about the basic principles and methods maintaining processes conducted to facilities equipment in certain plants. Study component covers maintenance principles and procedures, lubrication, Water Treatment Plant, Cooling Water Plant, Steam Generated Plant, Heating, Ventilation and Air-Conditioning (HVAC) and Internal Combustion Engine as well as testing equipment.</p>  | <p>CLO 1 :<br/>Apply the fundamentals of plant maintenance knowledge in related industry.<br/>(C3, PLO1)</p> <p>CLO 2 :<br/>Perform plant maintenance working flow, schedule and system correctly for the plant maintenance issues.<br/>(P4, PLO5)</p> <p>CLO 3 :<br/>Demonstrate plant maintenance concept that consider safety and health issues.<br/>(A3, PLO6)</p>              |
|          | DGM50263 STATIC AND ROTATING EQUIPMENT | 3      | NONE          | <p>STATIC AND ROTATING EQUIPMENT exposes students to the understanding of static and rotating equipment frequently used in petrochemical plant. This course provides basic knowledge on the classifications, types and specific functions of the components of several systems. During this course, the student will also be exposed into practical skills regarding valves, belt and chain drive, bearing, pump, gears and clutch maintenance through practical works.</p> | <p>CLO 1 :<br/>Apply the static and rotating equipment according to classification, types and functions.<br/>(C3, PLO1)</p> <p>CLO 2 :<br/>Apply the static and rotating equipment according to classification, types and functions.<br/>(P4, PLO5)</p> <p>CLO 3 :<br/>Apply the static and rotating equipment according to classification, types and functions.<br/>(A4, PLO8)</p> |

| SEMESTER   | COURSE   | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|------------|--|--------|---------------|--|---|
| 5          | DGM50243 PROJECT 2                                       | 3      | DGM40232      | PROJECT 2 is a continuation of Project 1, focusing on developing the student's research engineering skills to be a professional level and provides the opportunity to collaborate with industries and research organizations for an innovative solution. This course enhances student's ability and skills pertaining to technical writing and presentation. | <p>CLO 1 :<br/>Validate solution to solve specified engineering problems in producing technical report accordance to the standard forma.<br/>(C4, PLO3)</p> <p>CLO 2 :<br/>Organizes project development process using appropriate techniques, resources, modern engineering and IT tools.<br/>(P5, PLO5)</p> <p>CLO 3 :<br/>Manage an effective presentation that consists of project activities and outcomes.<br/>(A5, PLO10)</p> |
| ELECTIVE S | DGM50272 STATIC AND ROTATING EQUIPMENT WORKSHOP PRACTICE | 2      | NONE          | STATIC AND ROTATING EQUIPMENT WORKSHOP PRACTICE is the practice of dismantling and reassembling the static and rotating equipment used in oil and gas processing and petrochemical plants. This course also exposes the students to the inspection and maintenance activities for static and rotating equipment used in petrochemical plant.                 | <p>CLO 1 :<br/>Organizes the proper procedures upon using tools and equipment according to standard operating procedure.<br/>(P3, PLO5)</p> <p>CLO2 :<br/>Perform the procedures of maintenance according to standard operating procedure.<br/>(P4, PLO5)</p> <p>CLO3 :<br/>Arrange skill of ethic effectively on well-defined engineering activities based on related static and rotating equipment practice.<br/>(A3, PLO7)</p>   |

| SEMESTER   | COURSE                            | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|------------|-----------------------------------|--------|---------------|---|--|
| ELECTIVE S | DGM40172 PNEUMATIC AND HYDRAULICS | 2      | NONE          | PNEUMATICS AND HYDRAULICS provides students with the knowledge and understanding related to pneumatics, electropneumatics, hydraulics and electrohydraulics. It emphasizes on the systems, processes, standard symbols and circuit design using simulation software and hardware. To summarize, the course includes practical work, practical test and mini project.      | <p>CLO1 :<br/>Draw pneumatic, electropneumatic, hydraulic and electrohydraulic circuit diagram.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Construct pneumatic, electropneumatic, hydraulic and electrohydraulic circuits using simulation software and hardware.<br/>(P4 , PLO3)</p> <p>CLO3 :<br/>Demonstrate project design concept that considers safety and health Issues.<br/>(A3 , PLO6)</p> |
|            | DJJ20282 COMPUTER AIDED DESIGN    | 2      | NONE          | COMPUTER AIDED DESIGN exposes students to the fundamentals and principles of 3D drawing using 3D CAD software. Students are also equipped with various methods of creating a solid model using extrude, revolve, swept, assembly, simulation, an animation and details drawing. Hands-on exercises drawing of mechanical engineering will also be covered in this course. | <p>CLO1:<br/>Apply CAD commands in order to produce engineering drawing.<br/>(C3 , PLO1)</p> <p>CLO2:<br/>Construct 3D drawing of Mechanical Components according Drawing Standards.<br/>(P3, PLO5)</p> <p>CLO3:<br/>Demonstrate a presentation with following technical standard communication.<br/>(A3 , PLO9)</p>   |

| SEMESTER   | COURSE                                    | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO  |
|------------|---|--------|---------------|--|--|
| ELECTIVE S | DJJ40432 ENGINEERING PLANT TECHNOLOGY     | 2      | NONE          | ENGINEERING PLANT TECHNOLOGY introduces power plant technology industry such as steam power plant, gas turbine power plant, combine cycle plant, diesel power plant and water treatment.   | <p>CLO1 :<br/>Organize the concepts and technology of power plant system and components; and suggest solution. (C3, PLO2)</p> <p>CLO2 :<br/>Classify the professional ethics and responsibility and norms in power plant. (C4, PLO7)</p> <p>CLO3 :<br/>Demonstrate skill of effective communication on well-defined engineering problems. (A3, PLO9)</p>   |
|            | DJJ40472 RENEWABLE AND SUSTAINABLE ENERGY | 2      | NONE          | RENEWABLE AND SUSTAINABLE ENERGY focuses on the principles of renewable energy and the sustainability of energy in terms of climate change and the implications of renewable energy to the economy, society, and the environment. This includes possible renewable energy technologies such as biomass, ocean, hydropower, geothermal, wind and solar energy. Students should be able to describe the new perspective of renewable energy and its sustainability for widespread applications such as electricity generation, heating and cooling, transportation and industrial processes. | <p>CLO1 :<br/>Show the applications, principle operation and process of various types of renewable energy and non-renewable energy. (C3 , PLO1)</p> <p>CLO2 :<br/>Determine the environmental and social issues of renewable and non renewable energy with appropriate consideration for sustainability, economic, and environmental considerations (C4 , PLO6)</p> <p>CLO3 :<br/>Organize continuous learning while engaging in the new knowledge of renewable and sustainable energy. (A3 , PLO11)</p> |

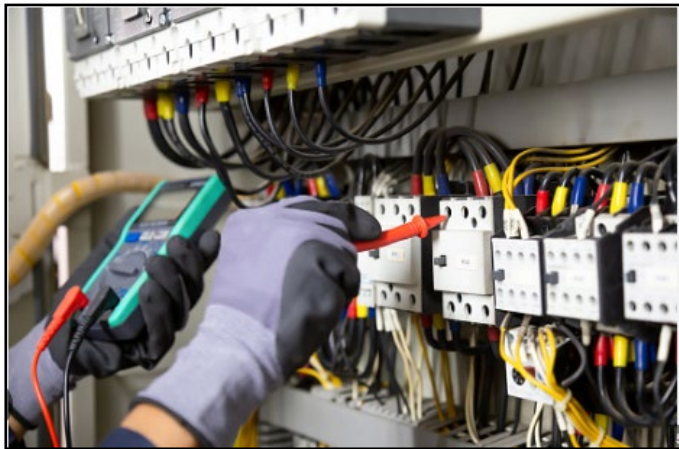
| SEMESTER   | COURSE                              | CREDIT | PRE REQUISITE | SYNOPSIS   | CLO   |
|------------|-------------------------------------|--------|---------------|--|---|
| ELECTIVE S | DJM40242 PROGRAMMABLE LOGIC CONTROL | 2      | NONE          | <p>PROGRAMMABLE LOGIC CONTROLLER is a course designed to provide knowledge regarding the fundamental concept and principle in PLC. This course emphasizes the relationship between conventional/hardwired/relay adder logic (RLL) and PLC system application of various industrial input and output devices of PLC, designing process, programming, constructing and PLC maintenance method. This course also provides knowledge and skills in designing environmentally friendly of automation control system based on conventional/ hardwired/ relay adder logic (RLL) and PLC students with hardware adaptation and programming skills by employing a PLC for an automation system in the industry.</p> | <p>CLO1 :<br/>Evaluate environmental-friendly automation control system using PLC.<br/>(C5, PLO2)</p> <p>CLO2 :<br/>Integrate PLC systems by employing the proper tools to programme, build, Diagnose, and troubleshoot systems.<br/>(P6, PLO3)</p> <p>CLO3 :<br/>Demonstrate the environmentally-conscious inbuilt system of the PLC by showcasing its dedication to sustainability and energy efficiency.<br/>(A3, PLO6)</p>        |
|            | DJJ40352 COMPUTER PROGRAMMING       | 2      | NONE          | <p>COMPUTER PROGRAMMING course introduces program design and development. Students will learn to design, code, debug, test, and document well-structured programs based on technical and engineering problem. Topic covered software development principle, programming language basic, data types, input and output operation, the use of selection, loops, arrays, internet of things and Arduino in industries.</p>   | <p>CLO1 :<br/>Apply C Programming commands to solve given problem using an appropriate data type.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Constructs a high level programming language in solving variety engineering and scientific problems.<br/>(P4 , PLO3)</p> <p>CLO3 :<br/>Demonstrate a solutions for assigned project based on programming which relates to current or upcoming technologies and peripherals.<br/>(A3 , PLO11 )</p> |

| SEMESTER        | COURSE                   | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|-----------------|--------------------------|--------|---------------|---|--|
| FREE ELECTIVE S | DJF52092 QUALITY CONTROL | 2      | NONE          | <p>QUALITY CONTROL provides knowledge on basic principle and concept of quality including statistical method in controlling products quality or services. This course also emphasizes on the application of control chart and quality control tools and explains the quality improvement technique.</p>   | <p>CLO1 :<br/>Apply the basic quality principles, management system and tools related to manufacturing industry. (C3, PLO1)</p> <p>CLO2 :<br/>Analyze manufacturing process and its issues using the quality tools and technique for process improvement in quality. (C4, PLO2)</p> <p>CLO3:<br/>Demonstrate ability to work in a team to solve quality problem in Manufacturing. (A3, PLO8)</p> |
|                 | DUD10012 DESIGN THINKING | 2      | NONE          | <p>DESIGN THINKING offers the basic concept of design thinking through active experiential learning. Students learn the five iterative phases of design thinking, which are empathy, define, ideate, prototype and testing. Students will apply these design thinking principles, processes and techniques to solve a real-world problem and develop an innovative solution in the form of a product, system or service. Design thinking can also be used as a methodology in product design, software development, business strategy and final year project. It is valued for its ability to foster creativity, collaboration and a user-centric mindset in tackling complex problems.</p> | <p>CLO1:<br/>Apply design thinking principles, processes and techniques to solve a real-world problem innovatively. (C3, PLO3)</p> <p>CLO2:<br/>Propose appropriate solutions to real-world problems by fostering collaborative skills in teamwork. (A3, PLO9)</p>   |

| SEMESTER | COURSE                                     | CREDIT | PRE REQUISITE | SYNOPSIS  | CLO  |
|----------|--|--------|---------------|---|--|
| 6        | DUT6009 10 ENGINEERING INDUSTRIAL TRAINING | 10     | NONE          | <p>THE ENGINEERING INDUSTRIAL TRAINING course would provide students with first-hand experience in an engineering-practice environment outside the institution. Students would put into practice prior knowledge and skills, strengthened through industry supervision to acquire higher mastery of engineering essentials and craft skills. Students would also be able to enhance their understanding of the respective job scope requirements, roles in a diversified work environment, professional ethics, and responsibilities, as well as to improve their communication aptitude in performing the tasks, while developing the necessary lifelong learning skills at the workplace.</p> | <p>CLO1:<br/>Perform the assigned task according to the requirements of the job scope.<br/>(P4, PLO5)</p> <p>CLO2:<br/>Explain tasks assigned in the workplace utilizing effective communication skills.<br/>(A4, PLO9)</p> <p>CLO3:<br/>Display ability to work collaboratively and individually based on the given task.<br/>(P4, PLO8)</p> <p>CLO4:<br/>Practice professional ethics and fulfill responsibilities as an engineering technician.<br/>(A5, PLO7)</p> <p>CLO5:<br/>Initiate responsibilities as an engineering technician while adhering to policies, rules, and safety.<br/>(A3, PLO6)</p> <p>CLO6:<br/>Write a report based on the given task, adhering to technical practices.<br/>(C3, PLO2)</p> <p>CLO7:<br/>Demonstrate lifelong learning skills in completing the given task.<br/>(P4, PLO11)</p> |



## ***DIPLOMA IN ELECTRICAL AND INSTRUMENTATION ENGINEERING***



# DIPLOMA IN ELECTRICAL AND INSTRUMENTATION ENGINEERING



## INTRODUCTIONS

Industry 4.0 transforms manufacturing processes from product design to fabrication, operation and maintenance. It fosters automation and data exchange in manufacturing technologies and processes through physical-cyber systems. Industry 4.0, a subset of the 4IR, focuses on the manufacturing sector, whereas 4IR encompasses almost every industry and all aspects of human life. The Fourth Industrial Revolution (4IR) is a fusion of technologies, which cuts across the physical, digital and biological worlds. It evolves exponentially as a result of the multifaceted, deeply interconnected world we live in. Emerging fields of knowledge continue to produce newer and ever more capable technology. In line with the 3rd Industrial Malaysia Plan (IMP3) aiming for the innovative and creative human capital development, via matching talent to expertise with market demand, Diploma in Electrical and Instrumentation Engineering for polytechnic is developed to give balance emphasis on theoretical and practical aspects. To keep abreast with rapid demand in TVET sector, Department of Polytechnic and Community College Education (DPCCE) progressively collaborates with major industry players in the country in developing the curriculum. The programme will take six semesters to complete, five academic semesters at their respective polytechnics and one semester of industrial training at relevant industries during the final semester. This programme complies with the Board of Engineer (BEM) requirement.

## SYNOPSIS

The Diploma in Electrical and Instrumentation Engineering programme is designed to produced holistic graduates that have knowledge and competent skills in the field of mechanical engineering to fulfil the demand of workers in engineering sector. The programme structure focusses on the area of Electrical Power, Software and Hardware Design, Instrumentation, Machine & Drive, Measurement, Safety, Electronics and Petrochemical.

## JOB PROSPECT

This programme provides the knowledge and skills in Electrical and Instrumentation Engineering field that can be applied to a broad range of careers in Electrical and Instrumentation Engineering. The knowledge and skills that the students acquire from the programme will enable them to participate in the job market as:

- a. Assistant Engineer
- b. Technical Assistant
- c. Assistant Service Manager
- d. Service Advisor
- e. Supervisor
- f. Technician
- g. Technical Instructor or Lecturer
- h. Technical Sales Executive / Engineer
- i. Draughter / Designer
- j. Entrepreneur

## **PROGRAMME AIMS**

The programme believes that every individual has potential and the program aims to develop adaptable and responsible Senior Assistant Engineers to support government aspiration to increase workforce in engineering related field.

## **PROGRAMME EDUCATIONAL OBJECTIVES (PEO)**

Diploma in Electrical and Instrumentation Engineering programme should produce balanced and competent TVET workers who are:

- PEO1 : Proficient with industry-relevant knowledge and skills in electrical and instrumentation engineering field.
- PEO2 : Engaging on lifelong and continuous learning to enhance knowledge and skills.
- PEO3 : Acquire with entrepreneurial skills and mindset in the real working environment.
- PEO4 : Establish links with society and players in the industry.

## **PROGRAMME LEARNING OUTCOMES (PLO)**

PLO1: Apply knowledge of applied mathematics, applied science, computer and engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices in area of electrical and instrumentation engineering.

PLO2: Identify and analyse well-defined engineering problems reaching

substantiated conclusions using codified methods of analysis specific to electrical and instrumentation engineering field (DK1 to DK4).

- PLO3: Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety as well as, cultural, societal and environmental considerations in area of electrical and instrumentation engineering (DK5).
- PLO4: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements (DK8).
- PLO5: Apply appropriate techniques, resources, and modern engineering computing and IT tools to well-defined engineering problems, with an awareness of the limitations (DK2, DK6).
- PLO6: Consider sustainable development impacts\* to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving well- defined engineering problems (DK1, DK5, DK7).
- PLO7: Understand and commit to professional ethics and responsibilities and norms of technician practice and including compliance with national and international laws. Demonstrate an understanding of the need for diversity and inclusion (DK9).
- PLO8: Function effectively as an individual, and as a member in diverse and inclusive teams in multi-disciplinary, face-to-face, remote and distributed settings (DK9).
- PLO9: Communicate effectively and inclusively on well-defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions.
- PLO10: Demonstrate awareness of engineering management principles as a member or leader in a technical team and to manage projects in multidisciplinary environments.
- PLO11: Recognise the need for, and have the ability for i) independent and lifelong learning and ii) critical thinking in the face of specialised technical knowledge (DK8).

\*Represented by the 17 UN Sustainable Development Goals (UN-SDG).

## **Notes:**

- DK 1 : A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline and awareness of directly relevant social sciences.
- DK 2 : Procedural mathematics, numerical analysis, statistics applicable in a sub-discipline.
- DK 3 : A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline.
- DK 4 : Engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline.
- DK 5 : Knowledge that supports engineering design and operations based on the techniques and procedures of a practice area.
- DK 6 : Codified practical engineering knowledge in recognised practice area.
- DK 7 : Knowledge of issues and approaches in engineering technician practice, such as public safety and sustainable development.\*
- DK 8 : Engagement with the current technological literature of the practice area.
- DK 9 : Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

# PROGRAMME STRUCTURE (SEM 1- SEM 6)

| COURSE TYPE       | COURSE CODE | COURSE NAME                                     | CONTACT HOURS |   |   | CREDIT VALUES | PROGRAMME LEARNING OUTCOME (PLO) |                       |  |               |            |                            |        |                                       |                |                                | PREREQUISITE |                    |           |  |
|-------------------|-------------|---|---------------|---|---|---------------|----------------------------------|-----------------------|--|---------------|------------|----------------------------|--------|---------------------------------------|----------------|--------------------------------|--------------|--------------------|-----------|--|
|                   |             |   | L             | P | T |               | O                                | PLO1                  | PLO2   | PLO3          | PLO4       | PLO5                       | PLO6   | PLO7                                  | PLO8           | PLO9                           |              | PLO10              | PLO11     |  |
|                   |             |   |               |   |   |               |                                  | Engineering Knowledge | Problem Analysis Design/development of Solutions | Investigation | Tool Usage | The Engineer and the World | Ethics | Individual and Collaborative Teamwork | Communications | Project Management and Finance |              | Life Long Learning |           |  |
| <b>SEMESTER 1</b> |             |   |               |   |   |               |                                  |                       |  |               |            |                            |        |                                       |                |                                |              |                    |           |  |
| Compulsory        | DUE10062    | Technical English 1                             | 1             | 0 | 2 | 0             | 2                                |                       |  |               |            |                            |        |                                       |                |                                | A2<br>A3     | A2                 |           |  |
|                   | MPU 24031   | Sukan 1   |               |   |   |               |                                  |                       |  |               |            |                            |        |                                       |                |                                |              |                    |           |  |
|                   | MPU 24041   | Kelab/Persatuan 1                               | 0             | 2 | 0 | 0             | 1                                |                       |  |               |            |                            |        | P2                                    |                |                                | A3           |                    |           |  |
|                   | MPU 24XX1   | Unit Beruniform 1                               |               |   |   |               |                                  |                       |  |               |            |                            |        |                                       |                |                                |              |                    |           |  |
| Common Core       | DBM10163    | Engineering Mathematics 1                       | 2             | 0 | 2 | 0             | 3                                | C3                    | C3   |               |            |                            |        |                                       |                |                                | A3           |                    |           |  |
|                   | DBS10042    | Engineering Science                             | 2             | 1 | 0 | 0             | 2                                | C3                    | P3   |               |            | A3                         |        |                                       |                |                                |              |                    |           |  |
| Discipline Core   | DGI10163    | Electric Circuits I                             | 2             | 2 | 0 | 0             | 3                                | C3                    |  |               | P3         |                            |        |                                       |                |                                | A3           |                    |           |  |
|                   | DGI10173    | Electrical Wiring                               | 1             | 3 | 0 | 0             | 3                                | C3                    |  |               | P4         |                            |        |                                       |                |                                | A3           |                    |           |  |
|                   | DGI10183    | Measurement                                     | 2             | 2 | 0 | 0             | 3                                | C3                    |  |               | P3         |                            |        |                                       |                |                                | A3           |                    |           |  |
| <b>TOTAL</b>      |             |   | <b>24</b>     |   |   |               | <b>17</b>                        |                       |  |               |            |                            |        |                                       |                |                                |              |                    |           |  |
| <b>SEMESTER 2</b> |             |   |               |   |   |               |                                  |                       |  |               |            |                            |        |                                       |                |                                |              |                    |           |  |
| Compulsory        | MPU21072    | Penghayatan Etika dan Peradaban                 | 1             | 0 | 2 | 0             | 2                                |                       |  |               |            |                            |        |                                       |                |                                | A2<br>A2     | A3                 |           |  |
|                   | MPU 24051   | Sukan 2   |               |   |   |               |                                  |                       |  |               |            |                            |        |                                       |                |                                |              |                    | MPU 24031 |  |
|                   | MPU 24061   | Kelab/Persatuan 2                               | 0             | 2 | 0 | 0             | 1                                |                       |  |               |            |                            |        |                                       |                |                                | P2           | A3                 | MPU 24041 |  |
|                   | MPU 24XX1   | Unit Beruniform 2                               |               |   |   |               |                                  |                       |  |               |            |                            |        |                                       |                |                                |              |                    | MPU 24XX1 |  |
|                   | MPU22071    | Integriti dan Anti-Rasuah                       | 0             | 0 | 2 | 0             | 1                                |                       |  |               |            |                            |        |                                       |                |                                | A2           | A3                 |           |  |
| Common Core       | DBM20173    | Engineering Mathematics 2                       | 2             | 0 | 2 | 0             | 3                                | C3                    | C3   |               |            |                            |        |                                       |                |                                | A3           |                    | DBM10163  |  |
| Discipline Core   | DGI20193    | Electric Circuits II                            | 2             | 2 | 0 | 0             | 3                                | C3                    |  |               | P3         |                            |        |                                       |                |                                | A3           |                    | DGI10163  |  |
|                   | DGI20203    | Electronics                                     | 2             | 2 | 0 | 0             | 3                                | C3                    |  |               | P3         |                            |        |                                       |                |                                | A3           |                    |           |  |
|                   | DGI20213    | Digital Electronic                              | 2             | 2 | 0 | 0             | 3                                | C3                    |  |               | P4         |                            |        |                                       |                |                                | A3           |                    |           |  |
| <b>TOTAL</b>      |             |   | <b>23</b>     |   |   |               | <b>16</b>                        |                       |  |               |            |                            |        |                                       |                |                                |              |                    |           |  |
| <b>SEMESTER 3</b> |             |   |               |   |   |               |                                  |                       |  |               |            |                            |        |                                       |                |                                |              |                    |           |  |
| Compulsory        | DUE30072    | Technical English 2                             | 1             | 0 | 2 | 0             | 2                                |                       |  |               |            |                            |        |                                       |                |                                | A2<br>A3     | A3                 |           |  |
| Common Core       | DBM30183    | Electrical Engineering Mathematics              | 2             | 0 | 2 | 0             | 3                                | C3                    | C3   |               |            |                            |        |                                       |                |                                | A3           |                    | DBM20173  |  |
|                   | DJ130332    | Engineering and Society                         | 2             | 0 | 0 | 0             | 2                                |                       |  |               |            | C3                         | C4     |                                       |                |                                | A3           |                    |           |  |
| Discipline Core   | DUW10042    | Occupational, Safety and Health for Engineering | 2             | 0 | 0 | 0             | 2                                | C2                    |  |               | A3         |                            | A3     |                                       |                |                                |              |                    |           |  |
|                   | DGM10173    | Engineering Drawing                             | 1             | 3 | 0 | 0             | 3                                | C3                    |  |               | P3         |                            |        |                                       |                |                                | A3           |                    |           |  |
|                   | DGI30223    | Electrical Machine & Control                    | 2             | 2 | 0 | 0             | 3                                | C3                    |  |               | P4         |                            |        |                                       |                |                                | A3           |                    |           |  |
|                   | DGI30233    | Power System                                    | 2             | 2 | 0 | 0             | 3                                | C3                    |  |               | P4         | A3                         |        |                                       |                |                                |              |                    |           |  |
| <b>TOTAL</b>      |             |   | <b>23</b>     |   |   |               | <b>18</b>                        |                       |  |               |            |                            |        |                                       |                |                                |              |                    |           |  |

| SEMESTER 4          |           |   |           |           |   |   |    |    |    |    |    |    |          |          |    |    |
|---------------------|-----------|---|-----------|-----------|---|---|----|----|----|----|----|----|----------|----------|----|----|
| Discipline Core     | DGI40243  | Control System  | 2         | 2         | 0 | 0 | 3  | C4 |    |    | P4 |    | A3       |          |    |    |
|                     | DGC40173  | Plant Utilities   | 2         | 2         | 0 | 0 | 3  | C3 |    |    | P4 | A3 |          |          |    |    |
|                     | DGP30383  | Piping and Instrumentation Diagram in Petrochemical Plant | 1         | 3         | 0 | 0 | 3  | C3 |    |    | P2 |    | A2       |          |    |    |
|                     | DGI40253  | Process Instrumentation and Control                       | 2         | 2         | 0 | 0 | 3  |    | C4 |    | P4 |    | A4       |          |    |    |
|                     | DGM40232  | Project 1   | 1         | 2         | 0 | 0 | 2  |    | C4 | P4 |    |    | A4       |          |    |    |
| Electives           | DGXXXXX   | Elective***   | 1         | 2         | 0 | 0 | 2  |    |    |    |    |    |          |          |    |    |
| <b>TOTAL</b>        |           |   | <b>22</b> | <b>16</b> |   |   |    |    |    |    |    |    |          |          |    |    |
| SEMESTER 5          |           |   |           |           |   |   |    |    |    |    |    |    |          |          |    |    |
| Compulsory          | MPU23182  | Sains Teknologi dan Kejuruteraan Islam*                   | 1         | 0         | 2 | 0 | 2  |    |    |    |    | A3 | A2       | A4       |    |    |
|                     | MPU23172  | Nilai Masyarakat Malaysia**                               |           |           |   |   |    |    |    |    |    | A3 | A2       | A4       |    |    |
|                     | DUE50082  | Technical English 3                                       | 1         | 0         | 2 | 0 | 2  |    |    |    |    |    | A4<br>A4 | A3       |    |    |
|                     | MPU22062  | Entrepreneurship  | 1         | 0         | 2 | 0 | 2  |    |    | P2 |    |    | A3       | A3       |    |    |
| Discipline Core     | DGM50243  | Project 2   | 1         | 4         | 0 | 0 | 3  |    | C4 | P5 |    |    | A5       | DGM40232 |    |    |
|                     | DGI50283  | PLC Technology  | 2         | 2         | 0 | 0 | 3  |    | C4 |    | P3 |    | A3       |          |    |    |
|                     | DGI50293  | Instrumentation   | 2         | 2         | 0 | 0 | 3  |    | C3 |    | P4 |    | A3       |          |    |    |
| <b>TOTAL</b>        |           |   | <b>22</b> | <b>15</b> |   |   |    |    |    |    |    |    |          |          |    |    |
| SEMESTER 6          |           |   |           |           |   |   |    |    |    |    |    |    |          |          |    |    |
| Industrial Training | DUT600610 | Engineering Industrial Training                           | 0         | 0         | 0 | 0 | 10 |    | C3 |    | P4 | A3 | A5       | P4       | A4 | P4 |
| <b>TOTAL</b>        |           |   | <b>0</b>  | <b>10</b> |   |   |    |    |    |    |    |    |          |          |    |    |
| ELECTIVES           |           |   |           |           |   |   |    |    |    |    |    |    |          |          |    |    |
| 1                   | DGI40262  | Embedded Robotic  | 1         | 2         | 0 | 0 | 2  |    | C3 |    | P4 |    | A3       |          |    |    |
| 2                   | DGI40272  | C Programming   | 1         | 2         | 0 | 0 | 2  |    | C3 |    | P4 |    | A3       |          |    |    |
| 3                   | DGI50302  | Instrument Calibration & Maintenance                      | 1         | 2         | 0 | 0 | 2  |    | C4 |    | P4 |    | A3       |          |    |    |
| FREE ELECTIVES      |           |   |           |           |   |   |    |    |    |    |    |    |          |          |    |    |
| 1                   | DUD10012  | Design Thinking   | 1         | 0         | 0 | 1 | 2  |    | C2 |    | A3 |    | A3       |          |    |    |

| Course Type            | Total Credit | Total %     |
|------------------------|--------------|-------------|
| i. Compulsory          | 15           | 30%         |
| ii. Common Core        | 13           |             |
| iii. Discipline Core   | 52           | 67%         |
| iv. Specialization     | 0            |             |
| v. Industrial Training | 10           |             |
| vi. Electives          | 2            | 2%          |
| <b>Total Credit</b>    | <b>92</b>    | <b>100%</b> |

| Engineering and Engineering Technology Courses                      |        |     |
|---|--------|-----|
| Total Credit (Discipline Core, Specialization, Industrial Training) |        | 64  |
|   | Credit | %   |
| i. Practice - Oriented Components                                   | 35     | 55% |
| ii. Engineering Technology (Specialization)                         | 0      | 0%  |

## SYNOPSIS AND LEARNING OUTCOMES (CLO) (SEM 1- SEM 6)

| SEMESTER | COURSE                       | CREDIT | PREREQUISITE | SYNOPSIS  | CLO  |
|----------|------------------------------|--------|--------------|---|--|
| 1        | DUE10062 TECHNICAL ENGLISH 1 | 2      | NONE         | <p>TECHNICAL ENGLISH 1 is designed to provide technical students the language input and skills required in technical workplace communication. This course aims to prepare students to use language skills to achieve B2 level which is becoming independent language users. Students will be exposed to skills required for effective participation in group discussions contextualized in workplace safety and health issues. The course also includes input and presentation skills on how to use the language appropriately in describing, comparing, and contrasting objects/ products relevant to students' respective engineering disciplines. The course will enable students to make verbal and written enquiries related to objects/ products for workplace use. The course is also designed to assist students in achieving at least level B1 of Common European Framework of Reference (CEFR).</p> | <p>CLO1:<br/>Discuss work-related topic using effective communication skills by responding to workplace safety and hazards relevant to engineering technician practice.<br/>(A2 , PLO11)</p> <p>CLO2:<br/>Explain the features and characteristics of objects/ products used in a well-defined technical activity.<br/>(A3 , PLO9)</p> <p>CLO3:<br/>Share effective communication skills in making and responding to enquiries related to a well-defined engineering activities.<br/>(A3 , PLO9)</p> |

|   |                                    |   |      |  |  |
|---|------------------------------------|---|------|--|--|
| 1 | DBS10042 ENGINEERING SCIENCE       | 2 | NONE | <p>ENGINEERING SCIENCE course introduces the physical concepts required in engineering disciplines. Students will learn the knowledge of fundamental physics in order to identify and solve engineering physics problems. Students will be able to perform experiments and activities to mastery physics concepts.</p>   | <p>CLO1 :<br/>Use basic physics concept to solve engineering physics problems.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Use knowlegde of fundamental physics in real engineering activities accurately.<br/>(A3 , PLO6)</p> <p>CLO3 :<br/>Perform appropriate activities related to physics concept.<br/>(P3 , PLO2)</p>  |
|   | DBM10163 ENGINEERING MATHEMATICS 1 | 3 | NONE | <p>ENGINEERING MATHEMATICS 1 exposes students to the basic algebra including resolve partial fractions. This course also covers the concept of trigonometry and the method to solve trigonometry problems by using basic identities, compound angle and double angle formulae. Students will be introduced to the theory of complex number and concept of vector and scalar. Students will explore advanced matrices involving 3x3 matrix.</p> | <p>CLO1 :<br/>Use mathematical statement to describe relationship between various physical phenomena.<br/>(C3 , PLO1)</p> <p>CLO2 :<br/>Show mathematical solutions using the appropriate techniques in mathematics.<br/>(C3 , PLO2)</p> <p>CLO3 :<br/>Use mathematical expression in describing real engineering problems precisely, concisely and logically.<br/>(A3 , PLO8)</p> |

|   |                              |   |      |   |  |
|---|------------------------------|---|------|---|--|
| 1 | DG110163 ELECTRIC CIRCUITS I | 3 | NONE | <p>ELECTRIC CIRCUITS 1 introduces students to the fundamentals of Direct Current (DC) electrical circuits. It covers the basic laws, theorems and circuit techniques. This course also covers energy stored element in the circuits.</p>  | <p>CLO1 :<br/>Apply the principles and concept of DC electrical circuit using different method and approach. (C3, PLO1)</p> <p>CLO2 :<br/>Construct the laboratory activities of DC electrical circuit using appropriate electrical equipment. (P3, PLO5)</p> <p>CLO3 :<br/>Demonstrate the ability to work in team to complete assigned tasks. (A3, PLO8)</p>   |
|   | DG110173 ELECTRICAL WIRING   | 3 | NONE | <p>ELECTRICAL WIRING course exposes students to the aspects of wiring installation. Students will be able to relate theoretical aspect in practical work on electrical wiring during workshop sessions. This course provides the students with the knowledge and skill in doing different types of wiring installation, inspection and testing.</p> | <p>CLO1 :<br/>Apply the concept and principles of electrical safety and wiring in electrical wiring according to NIOSH and MS IEC 60364. (C3, PLO1)</p> <p>CLO2 :<br/>Construct single-phase domestic wiring, wiring inspection &amp; testing and wiring protection according to MS IEC 60364. (P4, PLO5)</p> <p>CLO3 :<br/>Demonstrate an understanding of professional ethics and responsibilities of engineering norms during performing single phase domestic wiring task (A3, PLO7)</p> |

|   |   |   |       |   |  |
|---|---|---|-------|---|--|
| 1 | DGI10183 MEASUREMENT                      | 3 | NONE  | <p>MEASUREMENT introduces students to the basic concept of electrical instrument and measurement. It covers the basic principles of measurement, safety precautions and meter calibration. Students will also use measurement devices such as analogue meters, DC and AC meters, analogue and digital multimeters, oscilloscopes, signal generators and power meters during practical session. This course also covers the basic concept and simple application of DC Bridge.</p>                       | <p>CLO1 :<br/>Apply the concept of measurement principles and measuring equipment in electrical and electronic measurement. (C3, PLO1)</p> <p>CLO2 :<br/>Construct meter calibrating and measuring technique using the correct measuring equipment. (P3, PLO5)</p> <p>CLO3 :<br/>Demonstrate good communication skill in good written communication through essay writing in a group on assigned topics within a stipulated time frame. (A3, PLO9)</p> |
| 2 | MPUJ21072 PENGHAYATAN ETIKA DAN PERADABAN | 2 | TIADA | <p>PENGHAYATAN ETIKA DAN PERADABAN ini menjelaskan tentang konsep etika dari perspektif peradaban yang berbeza. Ini bertujuan bagi mengenalpasti sistem, tahap perkembangan dan perbahasan berkaitan isu-isu kontemporari dalam aspek ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban dapat melahirkan pelajar yang bermoral dan profesional. Penerapan amalan pendidikan berimpak tinggi (HIEPs) yang berseuaian digunakan dalam penyampaian kursus ini.</p> | <p>CLO1:<br/>Membentangkan konsep etika dan peradaban dalam kepelbagaian tamadun. (A2, PLO7)</p> <p>CLO2:<br/>Menerangkan proses pemeraksanaan kesepaduan sosial merentas bangsa di Malaysia. (A2, PLO8)</p> <p>CLO3:<br/>Mencadangkan sikap yang positif terhadap isu dan cabaran kontemporari dari perspektif etika dan peradaban. (A3, PLO10)</p>   |

|   |  |   |          |  |  |
|---|--|---|----------|--|--|
| 2 | MPIU22071 KURSUS INTEGRITI DAN ANTI RASUAH | 1 | TIADA    | <p>KURSUS INTEGRITI DAN RASUAH (KIAR) merangkumi konsep asas tentang nilai integriti, bentuk perbuatan rasuah dan salah guna kuasa dalam kehidupan seharian serta organisasi dan langkah-langkah pencegahan rasuah.</p>  | <p>CLO1 :<br/>Membincangkan hubungan nilai integriti dan anti rasuah dengan isu semasa.<br/>(A2, PLO8)</p> <p>CLO2 :<br/>Menilai bentuk perlakuan rasuah dan salah guna kuasa dalam aktiviti seharian dan organisasi.<br/>(A3, PLO10)</p>  |
|   | DBM20173 ENGINEERING MATHEMATICS 2         | 3 | DBM10163 | <p>ENGINEERING MATHEMATICS 2 exposes students to the basic laws of indices and logarithms. This course introduces the basic rules of differentiation concepts to solve problems that relate to maximum, and minimum and calculate the rates of changes. This course discusses integration concepts in order to strengthen students' knowledge for solving area and volume-bounded region problems. In addition, students will learn the application of both techniques of differentiation and integration.</p> | <p>CLO1:<br/>Explain the relationship between various physical phenomena in algebra and calculus.<br/>(C3, PLO1)</p> <p>CLO2:<br/>Solve mathematics problems by using appropriate and relevant fundamentals calculus techniques.<br/>(C3, PLO2)</p> <p>CLO3:<br/>Use mathematics language to express mathematics ideas and arguments precisely, concisely and logically in calculus<br/>(A3, PLO8)</p> |
|   | DGI20193 ELECTRIC CIRCUITS II              | 3 | DGI10163 | <p>ELECTRIC CIRCUITS II is continuation of Electric Circuits I which provides students with knowledge on electrical c i r c u i t s. It emphasizes the principles of an alternating current AC waveform, complex number and sinusoidal steady-state circuit analysis.</p>  | <p>CLO1 :<br/>Utilize AC circuit concept and law in analysing AC circuits.<br/>(C3,PLO1)</p> <p>CLO2 :<br/>Construct the laboratory activities of AC circuit</p>   |

|   |                             |   |      |   |
|---|-----------------------------|---|------|---|
| 2 |                             |   |      | using appropriate electrical equipment. (P3, PLO5)<br><br>CLO3 :<br>Demonstrate the ability to work in team to complete assigned tasks. (A3, PLO8)  |
|   | DGI20203 ELECTRONICS        | 3 | NONE | ELECTRONICS course is an introduction to the basic electronic theories and devices. This course covers the fundamental of electronic devices which includes introduction of semiconductor, diodes, bipolar junction transistors (BJTs), multistage amplifiers and field effect transistor (FETs). The content encompasses device structure, circuit configurations, operations and its applications.<br><br>CLO1 :<br>Apply the characteristic and application of semiconductor devices based on the schematic diagrams. (C3, PLO1)<br><br>CLO2 :<br>Construct semiconductor devices application circuits based on schematic diagrams. (P3, PLO5)<br><br>CLO3 :<br>Demonstrate team work ability in completing assigned tasks. (A3, PLO8) |
|   | DGI20213 DIGITAL ELECTRONIC | 3 | NONE | DIGITAL ELECTRONICS introduces the theories on the basic of digital systems. This course emphasizes on the digital system fundamentals and applications. This course mainly covers number systems, code systems, logic gates, Boolean operations, combinational circuits, flip-flops, counters and registers.<br><br>CLO1 :<br>Implement the various number system codes, logic gates , booleann algebra and Karnaugh Map to construct the Combinational or Sequential Logic Circuits. (C3, PLO1)<br><br>CLO2 :<br>Perform the circuit design of logic diagrams. (P4,PLO5)  |

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|   |  |   |          |   | CLO3 :<br>Demonstrate the ability to work in team to complete assigned tasks. (A3,PLO8)  |
| 3 | DUE30072 TECHNICAL ENGLISH 2                 | 2 | NONE     | TECHNICAL ENGLISH 2 equips technical students with the required language skills to communicate effectively at the workplace mainly in describing process and procedures as well as giving instructions. It is also designed to develop students' skills in conducting and participating in meetings and responding appropriately to complaints related to specific situations. This content structure reflects the stated course learning outcomes to be achieved by the students in order to develop their interpersonal & communication skills. It will enable them to independently participate in technical discussion in work-context. This course also aims to prepare students to use language skills to achieve B2 of CEFR level. | CLO1 :<br>Practice effective oral presentation skills in the context of process, procedure and instruction in workplace situations using appropriate language . (A2 , PLO9)<br><br>CLO2 :<br>Demonstrate effective communication and social skills in conducting and participating in meetings in workplace situations. (A3, PLO9)<br><br>CLO3 :<br>Propose appropriate response(s) to complaints related to workplace situations. (A3, PLO11) |
|   | DBM 30193 ELECTRICAL ENGINEERING MATHEMATICS | 3 | DBM20173 | ELECTRICAL ENGINEERING MATHEMATICS exposes students to the statistical and probability concepts and their applications in interpreting data. The course also introduces the numerical methods concept to solve simultaneous equations by using Gaussian Elimination method, LU Decomposition using Doolittle and Crout methods, polynomial problems using Simple Fixed Point Iteration methods and Newton   | CLO1 :<br>Demonstrate mathematical concepts, formulate method of solutions and select appropriate techniques in solving routine mathematics problems. (C3, PLO1)<br><br>CLO2 :<br>Apply mathematical methods and concepts to solve engineering problems. (C3 , PLO2)   |

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| 3 |  |   |      | <p>Raphson method. In addition, the course also discuss Ordinary Differential Equation (ODE). To strengthen the students in solving engineering problems, Laplace Transform by using the Table of Laplace is also included. It is designed to build students' teamwork and problems-solving skill.</p>   | <p>CLO3 :<br/>Express mathematics ideas clearly by using correct mathematical terminology and proper mathematical notation. (A3 , PLO8)</p>  |
|   | DUW10042 OCCUPATIONAL, SAFETY AND HEALTH FOR ENGINEERING | 2 | NONE | <p>OCCUPATIONAL SAFETY AND HEALTH FOR ENGINEERING course is designed to impart understanding of the self-regulatory concepts and provisions under the Occupational Safety &amp; Health Act (OSHA) in Malaysia. This course presents the responsibilities of workers in implementing and complying with the safety procedures at work. Understanding of notifications of accidents, dangerous occurrences, poisoning and diseases and liability for offences will be imparted to students. This course will also provide an understanding of the key issues in OSH Management, Incident Prevention, Hazard Identification Risk Control and Risk Assessment (HIRARC), Fire Safety and First Aid, Workplace Environment and Ergonomics and guide the students gradually into this multi-disciplinary science.</p> | <p>CLO1 :<br/>Explain briefly Occupational Safety and Health (OSH) procedures, regulation and its compliance in Malaysia. (C2, PLO1)</p> <p>CLO2 :<br/>Describe hazards, risks and safe work practices in order to maintain health and safe work environment. (A3, PLO4)</p> <p>CLO3 :<br/>Justify the factor that can lead to accident in workplace. (A3, PLO6)</p> |

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| 3 | DJJ30332 ENGINEERING AND SOCIETY | 2 | NONE | <p>ENGINEERING AND SOCIETY focuses on the introduction to professional ethics, theory and philosophy of ethics, values in professional ethics, engineering bylaws and standards, issues in professional ethics and sustainability. It also relates towards IR 4.0 introduction and green engineering.</p>  | <p>CLO1 :<br/>Implement the roles of engineering profession towards the developing of society and the challenge of globalization with professional ethic (C3, PLO7)</p> <p>CLO2 :<br/>Determine the importance of engineering management, professional bodies, sustainability and green technology aspect in the engineering profession (C4, PLO6)</p> <p>CLO3 :<br/>Explain the issues of sustainability and green technology in engineering practice (A3, PLO9)</p> |
|   | DGM10173 ENGINEERING DRAWING     | 3 | NONE | <p>ENGINEERING DRAWING course provides the students with the fundamentals of engineering drawings. It emphasizes on the practical knowledge of drawing instruments and drawing techniques that will be applied in workshop practical activities and in Computer Aided Design courses. Computer Aided Design introduces and provides knowledge to Computer Aided Design (CAD) software application in developing engineering drawing particularly in engineering drawing. This course will enable students to explore the software from its graphical user interface to</p> | <p>CLO1 :<br/>Apply the basic fundamentals of engineering drawing and features of CAD software in producing engineering drawing. (C3 , PLO1)</p> <p>CLO2 :<br/>Construct the engineering drawing and CAD drawing according to the engineering drawing standards. (P3 , PLO5)</p> <p>CLO3 :<br/>Propose a project presentation with following engineering norms and practices in engineering drawing.</p>  |

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|---|---------------------------------------|---|------|--|---|
| 3 |                                       |   |      | command features including data entry, draw, modify, display control, drawing aids, layer, block, insert, dimensioning, hatching and plotting.   | (A3 , PLO9)   |
|   | DGI30223 ELECTRICAL MACHINE & CONTROL | 3 | NONE | ELECTRICAL MACHINE AND CONTROL provides knowledge about motor and generators used in the industry, understanding basic principle of various types of motors and generators. Exposure will include the basic theory, construction, principle operation, DC and AC machine control and solving related calculation problems. This course also provides skills training on motor control. | <p>CLO1 :<br/>Show the construction, operation and controlling methods of DC and AC machines.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Perform the controlling methods for DC and AC machines.<br/>(P4, PLO5)</p> <p>CLO3 :<br/>Demonstrate the ability to work in team to complete assigned tasks.<br/>(A3, PLO8)</p>                          |
|   | DGI30093 POWER SYSTEM                 | 3 | NONE | POWER SYSTEM equip students with basic knowledge on the power system and fault calculation. This course will focus on the three phase system, transformer and distribution system and also on fault calculation.   | <p>CLO1:<br/>Apply the knowledge of power system and fault calculation.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Perform practical work on power system using appropriate equipment.<br/>(P4, PLO5)</p> <p>CLO3 :<br/>Describe the importance of renewable energy to the societal, health, safety, legal and cultural issue.<br/>(A3, PLO6)</p> |

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| 4 | DG40103 CONTROL SYSTEMS  | 3 | NONE | <p>CONTROL SYSTEMS introduces students to the fundamental ideas of classical control theory such as the basic concept of control system, transfer function, block diagram, signal flow graph, time response analysis and controller. Students will also be introduced to the advanced control technique in control system. The goal is to instill the students' interest in the field of control system and to provide a solid background for engineering applications in control techniques.</p>    | <p>CLO1 :<br/>Determine the concept and principles of control system fundamental and engineering problems mathematically using appropriate techniques. (C4, PLO2)</p> <p>CLO2 :<br/>Perform the ability to handle control system equipment using proper techniques and procedures. (P4, PLO5)</p> <p>CLO3 :<br/>Demonstrate effective teamwork while doing practical work based on related procedures. (A3, PLO8)</p> |
|   | DGC40173 PLANT UTILITIES | 3 | NONE | <p>PLANT UTILITIES introduce and provides knowledge on different types of plant and its importance including various utility flow diagrams. It also exposes students to utility system and its functions, calculations, the basic design, the main equipment involved, functions, mechanical characteristics and its operating procedures. During this course, the students will also be exposed to practical skills regarding utility plant operations and maintenance through practical works.</p> | <p>CLO1 :<br/>Acquire the knowledge on the function, process flow and basic calculation involved in utility plant system. (C3, PLO1)</p> <p>CLO2:<br/>Perform practical tasks relating to utility plant operation. (P4, PLO5)</p> <p>CLO3:<br/>Demonstrate societal awareness towards sustainable management of environment. (A3, PLO6)</p>   |

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| 4 | DGF30383 PIPING AND INSTRUMENTATION DIAGRAM IN PETROCHEMICAL PLANT | 3 | NONE | <p>PIPING AND INSTRUMENTATION DIAGRAM IN PETROCHEMICAL PLANT provides knowledge of recognizing symbols used in process flow diagram including equipment, piping and instrument. This course also provides practical skills in reading piping and instrumentation diagram (P&amp;ID) on the actual process to enable students to read and to draw in the industry.</p>  | <p>CLO1 :<br/>Construct the appropriate piping identification system, instruments and control system of a flow diagram in a plant operation.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Explains the design of symbols and types of processes in a flow diagram.<br/>(P2, PLO5)</p> <p>CLO3 :<br/>Discuss ideas clearly in groups when performing a given task in reading piping and Instrumentation diagrams.<br/>(A2, PLO8)</p>    |
|   | DGI40253 PROCESS INSTRUMENTATION AND CONTROL                       | 3 | NONE | <p>PROCESS INSTRUMENTATION AND CONTROL provides knowledge about measurement equipment used in the industry, understanding basic principle and the job lists of instruments. Exposure will include the basic theory, construction, operation and the usage of pneumatic equipment, control valves, related transmitter and controllers. Students will understand the basic principle for control system, related transmitters and its usage according to the petrochemical plant situation.</p> | <p>CLO1:<br/>Determine the fundamentals of process control system, measurement and working principle of the instrumentation used in the process plant.<br/>(C4,PLO2)</p> <p>CLO2:<br/>Perform the measurement and basic process control system applied in process plant.<br/>(P4,PLO5)</p> <p>CLO3:<br/>Demonstrate good communication through practical work in a group within a stipulated time frame.<br/>(A4,PLO9)</p> |

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| 4 | DGM40232 PROJECT 1                              | 2 | NONE | <p>PROJECT 1 introduces students with the ability and skills in planning and managing an innovative solution based on their engineering research areas. It also provides students with writing technical proposal and presentation skills. Under the supervision, this course exposes the students with the ability to show a professional attitude regarding time planning, collaboration, integrate between theoretical and practical knowledge.</p> | <p>CLO1:<br/>Document an effective technical project proposal to solve welldefined problems in the related engineering field.<br/>(C4, PLO3)</p> <p>CLO2:<br/>Organize an investigation of well-defined problems to provide an innovative and creative solutions for selected engineering research project.<br/>(P4, PLO4)</p> <p>CLO3:<br/>Relate knowledge and developed skills to manage the project.<br/>(A4, PLO10)</p> |
| 5 | MPU23182 SAINS TEKNOLOGI DAN KEJURUTERAAN ISLAM | 2 | NONE | <p>SAINS TEKNOLOGI DAN KEJURUTERAAN ISLAM memberi pengetahuan tentang konsep islam sebagai al-Din dan seterusnya membincangkan konsep sains, teknologi dan kejuruteraan dalam islam serta impaknya, pencapaiannya dalam tamadun islam, prinsip serta peranan syariah dan etika islam, peranan kaedah fiqh serta aplikasinya.</p>   | <p>CLO1:<br/>Melaksanakan amalan islam dengan betul dalam kehidupan seharian.<br/>(A2, PLO8)</p> <p>CLO2:<br/>Menerangkan etika dan profesionalisme berkaitan sains teknologi dan kejuruteraan dalam islam.<br/>(A3, PLO7)</p> <p>CLO3:<br/>Menghubungkait minda ingin tahu dengan prinsip syariah, etika dan kaedah fiqh dalam bidang sains,teknologi dan kejuruteraan menurut perspektif islam.<br/>(A4, PLO10)</p>        |

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| <b>5</b> | MPU23172 NILAI MASYARAKAT MALAYSIA | 2 | NONE | <p>NILAI MASYARAKAT MALAYSIA disediakan untuk membincangkan aspek sejarah pembentukan masyarakat, nilai-nilai agama, adat resam budaya masyarakat di Malaysia. Selain itu, pelajar dapat mempelajari tentang tanggungjawab sebagai individu dan nilai perpaduan dalam kehidupan di samping cabaran-cabaran dalam membentuk masyarakat Malaysia yang bersatupadu dan penyayang.</p>  | <p>CLO1:<br/>Membincangkan sejarah dan nilai dalam pembentukan masyarakat di Malaysia. (A2, PLO8)</p> <p>CLO2:<br/>Menerangkan etika dan profesioanlisme terhadap konsep perpaduan bagi meningkatkan semangat patriotisme masyarakat Malaysia. (A3, PLO7)</p> <p>CLO3:<br/>Menghubungkait minda ingin tahu dengan cabaran-cabaran dalam membentuk masyarakat Malaysia. (A4, PLO10)</p> |
|          | DUE50082 TECHNICAL ENGLISH 3       | 2 | NONE | <p>TECHNICAL ENGLISH aims to prepare students to use language skills (listening, reading, speaking and writing) to achieve B2 level in Common European Framework of Reference (CEFR) which is becoming independent language users. It covers skills which are needed by students focusing on self-assessment, job-search strategies, writing and explaining technical text (s) on wide range of technical subjects. Students will be able to select jobs or positions which match their qualifications, retrieve relevant information</p> | <p>CLO1:<br/>Prepare appropriate types of oral and written communication modes that meet employer's requirements. (A3, PLO9)</p> <p>CLO2:<br/>Demonstrate effective language-based skills in interpersonal communication, ethics and workplace related contexts. (A3, PLO11)</p> <p>CLO3:<br/>Organize texts on a wide range of technical subjects to pass</p>                         |

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| 5 |                           |   | <p>regarding the positions available and request for a job interview. This course also aims to prepare students with skills to write effective resumes with accompanying cover letters. The second part of this course is divided into three stages which focuses on students' abilities to study different types of technical text (s), plan and prepare clear and detailed technical text (s) and explain the content of technical text (s) using effective presentation skills.</p> | <p>information as well as to give reasons in support of or against particular points of views. (A4, PLO9)</p>   |
|   | DUU10072 ENTREPRENEURSHIP | 2 | NONE   | <p>ENTREPRENEURSHIP focuses on the fundamentals and concept of entrepreneurship in order to inculcate the value and interest in students to choose entrepreneurship as a career. This course can help students to initiate creative and innovative entrepreneurial ideas. It also emphasizes on online and offline business learning in line with the changing needs of current market.</p> <p>CLO1:<br/>Demonstrate application on entrepreneurship concept, competencies, importance and social responsibilities of entrepreneurship. (A2, PLO9)</p> <p>CLO2:<br/>Propose sustainable business idea using Business Model Canvas (BMC) for entrepreneurial project. (A3, PLO10)</p> <p>CLO3:<br/>Organize online business using various cyber social tools. (P5, PLO3)</p> |

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| 5 | DGM50243 PROJECT 2       | 3 | DGM40232 | <p>PROJECT 2 is a continuation of Project 1, focusing on developing the student's research engineering skills to be a professional level and provides the opportunity to collaborate with industries and research organizations for an innovative solution. This course enhances student's ability and skills pertaining to technical writing and presentation.</p> | <p>CLO1:<br/>Validate solution to solve specified engineering problems in producing technical report accordance to the standard forma.<br/>(C4, PLO3)</p> <p>CLO2:<br/>Organizes project development process using appropriate techniques, resources, modern engineering and IT tools.<br/>(P5, PLO5)</p> <p>CLO3:<br/>Manage an effective presentation that consists of project activities and outcomes.<br/>(A5, PLO 10)</p>              |
|   | DGI 50283 PLC TECHNOLOGY | 3 | NONE     | <p>PROGRAMMABLE LOGIC CONTROLLER (PLC) TECHNOLOGY provides knowledge on application of PLC to the automation and process control of plants and factories as well as Distributed Control System (DCS). The course emphasizes the fundamentals of PLC hardware and software, design process, programming and maintenance methods.</p>                                 | <p>CLO1 :<br/>Determine the operation of PLC, simple automation sequential control and process plant control system based on PLC technology.<br/>(C4, PLO2)</p> <p>CLO2 :<br/>Constructs the programming, troubleshooting and maintenance for PLC system using appropriate equipment.<br/>(P3, PLO5)</p> <p>CLO3 :<br/>Demonstrate effectively as a part of team while doing practical work based on related procedures.<br/>(A3, PLO8)</p> |

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| <b>5</b>         | DGI50293 INSTRUMENTATION  | 3 | NONE | <p>INSTRUMENTATION provides knowledge regarding the concept and basic pneumatic system, electro pneumatic system, hydraulic system, and instrumentation drawing and equipment used in the processing industries. The emphasis of the course is to identify and provide knowledge of the general symbols, components in pneumatic and hydraulic systems as well as useful information on types of equipment used in a processing system.</p> | <p>CLO1 :<br/>Apply the principle of pneumatic, hydraulic and process instrument in process control.<br/>(C3, PLO1)</p> <p>CLO2 :<br/>Perform pneumatic, hydraulic and process instrument in process control.<br/>(P4, PLO5)</p> <p>CLO3 :<br/>Demonstrate efficient team work while doing practical work.<br/>(A3, PLO8)</p>  |
| <b>ELECTIVES</b> | DGI40262 EMBEDDED ROBOTIC | 2 | NONE | <p>EMBEDDED ROBOTIC course presents the combination of mobile robots and embedded systems, from introductory to intermediate level. It is structured in three parts, which are embedded systems, mobile robot and mobile robot applications. These parts are essential to students in mastering the crucial steps of building a complete working robotic system which will ensure robots can not only move but is also intelligent.</p>     | <p>CLO1:<br/>Derive the concept and fundamentals of mobile robotic, embedded controller, sensors and actuators based on land mobile robot design.<br/>(C3, PLO3)</p> <p>CLO2:<br/>Builds the concept of robot positioning, identification and communication in mobile robot control according to a standard robot organization regulation.<br/>(P4, PLO5)</p> <p>CLO3:<br/>Demonstrate good ability in managing a well-defined engineering-based</p> |

| ELECTIVES |   |   |      |   |  |
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| ELECTIVES | DG140272 C PROGRAMMING                        | 2 | NONE | <p>C PROGRAMMING course provides an introduction to program design and development. Student will learn to design, code, debug, test and documenting well-structured programs based on technical and engineering problems. This course will also cover software development principle, programming language basic, data types, input and output operation, the use of selection, loops, arrays and function structure.</p> | <p>project in a cost effective manner. (A3, PLO7)</p> <p>CLO1:<br/>Apply the concepts of C programming to solve given problem using an appropriate data type. (C3, PLO3)</p> <p>CLO2:<br/>Constructs a high level programming language in solving variety engineering and scientific problems. (P4, PLO5)</p> <p>CLO3:<br/>Display behavior consistent with a positive ethic to complete assigned project based on C programming. (A3, PLO7)</p> |
|           | DG150302 INSTRUMENT CALIBRATION & MAINTENANCE | 2 | NONE | <p>INSTRUMENT CALIBRATION &amp; MAINTENANCE provides understanding of metrology and standard practice. Students will be exposed to the basic theory, construction and practice of calibration equipment including the use of differential pressure transmitter, pressure transmitter, temperature transmitter, smart control valve and calibrator usage in order to perform calibration in a petrochemical plant .</p>    | <p>CLO1:<br/>Determine the fundamental of instrumentation and calibration for process plant equipment. (C4, PLO2)</p> <p>CLO2:<br/>Perform the measurement and basic calibration activity for process plant instrument. (P4, PLO5)</p>   |

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|                        |   |    |      |  | CLO3 :<br>Demonstrate excellent teamwork through practical work within a stipulated time frame. (A3, PLO8)  |
| <b>FREE ELECTIVE S</b> | DUD10012 DESIGN THINKING                  | 2  | NONE | DESIGN THINKING offers the basic concept of design thinking through active experiential learning. Students learn the five iterative phases of design thinking, which are empathy, define, ideate, prototype and testing. Students will apply these design thinking principles, processes and techniques to solve a real-world problem and develop an innovative solution in the form of a product, system or service. Design thinking can also be used as a methodology in product design, software development, business strategy and final year project. It is valued for its ability to foster creativity, collaboration and a user-centric mindset in tackling complex problems. | CLO1:<br>Apply design thinking principles, processes and techniques to solve a real-world problem innovatively. (C3, PLO3)<br><br>CLO2:<br>Propose appropriate solutions to real-world problems by fostering collaborative skills in teamwork. (A3, PLO9)   |
| <b>6</b>               | DUT600910 ENGINEERING INDUSTRIAL TRAINING | 10 | NONE | THE ENGINEERING INDUSTRIAL TRAINING course would provide students with first-hand experience in an engineering-practice environment outside the institution. Students would put into practice prior knowledge and skills, strengthened through industry supervision to acquire higher mastery of engineering essentials and craft skills. Students would also be able to enhance their understanding of the respective job scope requirements, roles in a diversified work environment, professional ethics, and responsibilities, as well as to   | CLO1:<br>Perform the assigned task according to the requirements of the job scope. (P4, PLO 5)<br><br>CLO2:<br>Explain tasks assigned in the workplace utilizing effective communication skills. (A4, PLO9)<br><br>CLO3:<br>Display ability to work collaboratively and individually based on the given task. (P4, PLO 8) |

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|  |  |  |  | <p>improve their communication aptitude in performing the tasks, while developing the necessary lifelong learning skills at the workplace.</p> | <p>CLO4:<br/>Practice professional ethics and fulfill responsibilities as an engineering technician.<br/>(A5, PLO7)</p> <p>CLO5:<br/>Initiate responsibilities as an engineering technician while adhering to policies, rules, and safety.<br/>(A3, PLO6)</p> <p>CLO6:<br/>Write a report based on the given task, adhering to technical practices.<br/>(C3, PLO2)</p> <p>CLO7:<br/>Demonstrate lifelong learning skills in completing the given task.<br/>(P4, PLO11)</p> |
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