POLITEKNIK MALAYSIA
TUN SYED NASIR SYED ISMAIL

BUKU PANDUAN PROGRAM

JABATAN KEJURUTERAAN PETROKIMIA (JKPK)

- DIPLOMA KEJURUTERAAN PROSES (PETROKIMIA)
- DIPLOMA KEJURUTERAAN ELEKTRIK DAN INSTRUMENTASI
- DIPLOMA KEJURUTERAAN MEKANIKAL (PETROKIMIA)
- DIPLOMA KEJURUTERAAN KIMIA

ISI KANDUNGAN

PENGENALAN

FALSAFAH PENDIDIKAN

Pendidikan di Malaysia adalah suatu usaha berterusan ke arah memperkembangkan lagi potensi individu secara menyeluruh dan bersepadu untuk mewujudkan insan yang seimbang dan harmonis dari segi intelek, rohani, emosi dan jasmani berdasarkan kepercayaan dan kepatuhan kepada Tuhan. Usaha ini adalah bagi melahirkan rakyat Malaysia yang berilmu pengetahuan, berketerampilan, berakhlak mulia, bertanggungjawab dan berkeupayaan mencapai kesejahteraan diri, serta memberi sumbangan terhadap keharmonian dan kemakmuran keluarga, masyarakat dan negara.

10 LONJAKAN PPPM-PT

MISI JPP

- Menyediakan akses kepada program TVET yang berkualiti dan diiktiraf
- Membangunkan kurikulum yang dipimpin industri dan meningkatkan kesediaan graduan melalui penglibatan industri yang diselaraskan
- Menghasilkan graduan yang seimbang dan berdaya keusahawanan melalui program pengajian yang dinamik dan mampan
- Mendapat pengiktirafan antarabangsa melalui kerjasama dan penyertaan aktif dalam komuniti TVET

VISI JPP

Menjadi institusi TVET premier yang diterajui industri

SEJARAH PTSN

Politeknik Tun Syed Nasir Syed Ismail (PTSN) bermula dengan nama Politeknik Pagoh Johor (PPJ). Merupakan politeknik yang ke-33 ditubuhkan pada 21 Februari 2014, di bawah naungan Kementerian Pendidikan Tinggi Malaysia. Penubuhan PPJ sejajar dengan visi JPP sebagai penjana modal insan inovatif melalui pendidikan & latihan transformasi. Penempatan kampus sementara PPJ adalah di Kampus B, Politeknik Sultan Hj. Ahmad Shah (POLISAS), Semambu, Kuantan, Pahang. Pengambilan pelajar PPJ yang pertama adalah pada Sesi Jun 2014 bagi Program Diploma Teknologi Makanan (DTM) dan disusuli pengambilan pelajar Diploma Kejuruteraan Proses (Petrokimia)- DPE pada sesi Disember 2014. PPJ telah berpindah ke kampus tetapnya di Hab Pendidikan Tinggi Pagoh, Johor pada Jun 2017. PTSN yang terdiri daripada dua jabatan induk, iaitu Jabatan Kejuruteraan Petrokimia (JKPK) dan Jabatan Teknologi Kimia dan Makanan (JTKM). Akademik di PTSN turut disokong dengan dua jabatan akademik sokongan, iaitu Jabatan Matematik, Sains dan Komputer (JMSK) dan Jabatan Pengajian Am (JPA). Bermula Sesi Jun 2017, PTSN telah menawarkan sebanyak enam Program yang terdiri daripada empat Program di bawah seliaan JKPK dan dua Program si bawah seliaan JTKM.

VISI PTSN

Menjadi peneraju institusi TVET yang unggul.

MISI PTSN

1. Menyediakan akses yang meluas kepada program TVET berkualiti dan diiktiraf.
2. Memperkasa komuniti melalui pembelajaran sepanjang hayat.
3. Melahirkan graduan holistic, bericiri keusahawanan dan seimbang.
4. Memanfaatkan sepenuhnya perkongsian pintar dengan pihak berkepentingan.

JABATAN KEJURUTERAAN PETROKIMIA (JKPK)

JABATAN KEJURUTERAAN PETROKIMIA (JKPK)

PENGENALAN

Penubuhan Jabatan Kejuruteraan Petrokimia bertujuan untuk menampung permintaan yang tinggi untuk keperluan industri dan komuniti dalam bidang petrokimia.

PTSN merupakan politeknik yang kedua selepas Politeknik Kuching Sarawak yang menawarkan program dalam bidang petrokimia.

JKPK menawarkan empat program iaitu;

1. DIPLOMA KEJURUTERAAN PROSES (PETROKIMIA) – DPE
2. DIPLOMA KEJURUTERAAN ELEKTRIK & INSTRUMENTASI – DEI
3. DIPLOMA KEJURUTERAAN MEKANIKAL (PETROKIMIA) – DPC
4. DIPLOMA KEJURUTERAAN KIMIA – DCE

Program-program yang ditawarkan memberi pendedahan kepada pelajar dalam bidang petrokimia seperti proses yang terlibat, produk yang dihasilkan, pengendalian dan penyelenggaraan loji pemprosesan petrokimia dan sebagainya.

SENARAI FASILITI

1. Bengkel Projek
2. Makmal Elektronik Digital
3. Makmal Petrokimia
4. Makmal CAD
5. Bengkel Gegas dan Mesin
6. Makmal Kimia
7. Bengkel Peralatan Petrokimia
8. Makmal Komputer
9. Bengkel Loji Mini
10. Makmal Teknologi Elektrik
11. Bengkel Kimpalan
12. Makmal Termobendalir
13. Makmal Pneumatik dan Hidraulik
14. Makmal Pencemaran
15. Makmal Kekuatan Bahan & Mekanik Mesin
16. Makmal Kejuruteraan Kimia
17. Makmal Mekanik Bendalir dan Termodinamik
18. Makmal Operasi Unit
19. Makmal Metalurgi
20. Makmal Reaktor Kimia
21. Makmal Instrumentasi dan Kawalan
22. Bengkel Projek 2
23. Makmal Teknologi Elektrik dan Elektronik
24. Centre Of Technology
25. Makmal Simulasi Proses

DIPLOMA KEJURUTERAAN PROSES(PETROKIMIA) (DPE)

DIPLOMA KEJURUTERAAN PROSES (PETROKIMIA)

INTRODUCTIONS

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 Process Engineering (Petrochemical) for polytechnic is developed to give balance emphasis on theoretical and practical aspects. The Eleventh Malaysia Plan was drawn to produce 60% out of 1.5 million workers was in TVET sector. Until now a total of 69,475 (51%) of the 136,062 technical education and vocational training (TVET) graduates in Malaysia are working as professionals and skilled workers. 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 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 Process Engineering (Petrochemical) programme is designed to produce holistic graduates that have knowledge and competent skills in the field of process engineering to fulfill the demand of workers in engineering sector. The programme structure focusses on the area of Mass and Energy Balance, Chemistry, Thermodynamics, Mechanical Plant Equipment, Heat and Mass Transfer, Fluid Mechanics, Separation Process, Process Control, Instrumentation and Electrical, Process Design and Reactor Technology.

JOB PROSPECT

This programme provides the knowledge and skills in Process Engineering field that can be applied to a broad range of careers in Process 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 programme aims to develop adaptable and responsible Senior Assistant Process Engineers to support government aspiration to increase workforce in engineering related field.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The Diploma in Process Engineering (Petrochemical) programme should produce balanced and competent TVET workers who are:

PEO1 : equipped with industry-relevant knowledge and skills in process engineering field

PEO2 : engaging on lifelong and continuous learning to enhance knowledge and skills

PEO3 : instilled with entrepreneurial skills and mind set in the real working environment

PEO4 : established strong linkage 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 specialization as specified in DK1 to DK4 respectively to wide practical procedures and practices

PLO2: identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity (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, cultural, societal, and environmental considerations (DK5)

PLO4: conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements

PLO5: apply appropriate techniques, resources, and modern engineering and IT tools to well-defined engineering problems, with an awareness of the limitations (DK6)

PLO6: demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to

engineering technician practice and solutions to well-defined engineering problems (DK7)

PLO7: understand and evaluate the sustainability and impact of engineering technician work in the solution of well-defined engineering problems in societal and environmental contexts (DK7)

PLO8: understand and commit to professional ethics and responsibilities and norms of technician practice

PLO9: function effectively as an individual, and as a member in diverse technical teams

PLO10: communicate effectively 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

PLO11: demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member or leader in a technical team and to manage projects in multidisciplinary environments

PLO12: recognise the need for, and have the ability to engage in independent updating in the context of specialised technical knowledge

PROGRAMME STRUCTURE (SEM 1- SEM 6)

Components	Course Code	Course	L	P	T	O	Credit Value
SEMESTER 1							
Compulsory	DUE10012	Communicative English 1	1	0	2	0	2
	MPU24XX1	Sukan	0	2	0	0	1
	MPU24XX1	Unit Beruniform 1	0	2	0	0	
Common Core	DUW10022	Occupational, Safety and Health for Engineering	2	0	0	0	2
	DBS10012	Engineering Science	2	1	0	0	2
	DBM10013	Engineering Mathematics 1	2	0	2	0	3
Discipline Core	DGP10013	Electrical Technology	2	2	0	0	3
	DGP10022	Applied Chemistry	2	0	0	0	2
	DGP10031	Chemistry Lab	0	2	0	0	1
	DGP10152	Computer Aided Design	0	3	0	0	2
		TOTAL	**25**				**18**
SEMESTER 2							
Compulsory	MPU23052	Sains, Teknologi dan Kejuruteraan Dalam Islam*	1	0	2	0	2
	MPU23042	Nilai Masyarakat Malaysia**	1	0	2	0	
	MPU24XX1	Kelab/Persatuan	0	2	0	0	1
	MPU24XX1	Unit Beruniform 2	0	2	0	0	
Common Core	DBM20023	Engineering Mathematics 2	2	0	2	0	3
Discipline Core	DGP20053	Thermodynamics	2	2	1	0	3
	DGP20062	Process Plant Equipment	1	2	0	0	2
	DGP20082	Fluid Mechanics	2	0	1	0	2
Specialization	DGP20093	Chemistry of Petrochemical Processes	2	2	0	0	3
		TOTAL	**24**				**16**
SEMESTER 3							
Compulsory	DUE30012	Communicative English 2	1	0	2	0	2
Common Core	DBM30033	Engineering Mathematics 3	2	0	2	0	3
Discipline Core	DGP30102	Process Instrumentation and Control	2	0	0	0	2
	DGP30111	Process Instrumentation and Control Lab	0	2	0	0	1
	DGP30122	Heat Transfer	2	0	1	0	2
	DGP30132	Mass and Energy Balance	2	0	1	0	2
	DGP30041	Piping and Instrumentation Diagram Workshop	0	2	0	0	1
	DGP30162	Process Engineering Lab 1	0	3	0	0	2
		TOTAL	**22**				**15**

SEMESTER 4							
Common Core	DJJ40132	Engineering and Society	2	0	0	0	2
Discipline Core	DGP40172	Process Engineering Lab 2	0	3	0	0	2
	DGP40182	Project 1	1	2	0	0	2
	DGP40192	Utility Plant	2	0	0	0	2
Specialization	DGP40202	Pollution Control in Petrochemicals Industry	2	0	0	0	2
	DGP40213	Petrochemical Process Technology	3	0	0	0	3
	DGP40222	Reactor in Petrochemicals Industry	2	0	0	0	2
		Elective***					
		TOTAL	**1**				**15**
SEMESTER *5*							
Compulsory	MPU21032	Penghayatan Etika dan Peradaban	1	0	2	0	2
	DUE50032	Communicative English 3	1	0	2	0	2
	MPU22012	Entrepreneurship	1	0	2	0	2
Discipline Core	DGP50232	Process Engineering Lab 3	0	3	0	0	2
	DGP50242	Project 2	0	4	0	0	2
Specialization	DGP50253	Petrochemical Production Processes	3	0	0	0	3
	DGP50263	Petrochemical Polymer	3	0	0	0	3
	DGP50272	Petrochemical Synthesis Product Lab	0	3	0	0	2
		TOTAL	**2**				**18**
Elective	DGP42012	Advanced Control Processes	**2**	**0**	**0**	**0**	**2**
	DGP42022	Petroleum Technology					
	DGP52032	Industrial Management					
	DGP52042	Waste Water Engineering					
	DJJ52012	Engineering Plant Technology					
SEMESTER 6							
Industrial Training	DUT600610	Engineering Industrial Training	0	0	0	0	10
		TOTAL	**0**				**10**

***Only one (1) elective course can be chosen either in semester 4 or 5

*For Muslim Students

**For Non Muslim Students

SYNOPSIS AND LEARNING OUTCOMES (CLO) (SEM1 – SEM6)

SEMESTER	COURSE	CREDIT	PRE REQUISITE	SYNOPSIS	CLO
1	DUW10022 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). This course presents the responsibilities of workers in implementing and complying with the safety procedures at work. Understanding of notifications of accidents, dangerous occurrence, poisoning and diseases and liability for offences will be imparted upon students. This course will also provide an understanding of the key issues in OSH	• CLO1 : Explain briefly Occupational Safety and Health (OSH) procedures, regulation and its compliance in Malaysia. (C2, PLO1) • CLO2 : Initiates incident hazards, risks and safe work practices in order to maintain health and safe work environment (A3, PLO8) • CLO3 : Forms communication skills in a team to respond for an accident action at workplace. (A3,PLO10)

				Management, Incident Prevention, Fire Safety, Hazard Identification Risk Control and Risk Assessment (HIRARC), Workplace Environment and Ergonomics and guide the students gradually into this multi-disciplinary science	
1	**DBS 10012 ENGINEERING SCINECE**	2	NONE	**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.	• CLO1 : Use basic physics concept to solve engineering physics problems (C3) • CLO2: Apply knowledge of fundamental physics in activities to mastery physics concept (C3) • CLO3 : Perform appropriate activities related to physics concept (P3)

1	**DBM 10013 ENGINEERING MATHEMATICS 1**	3	NONE	**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.	• CLO1 : Use mathematical statement to describe relationship between various physical phenomena. (C3) • CLO2 : Show mathematical solutions using the appropriate techniques in mathematics.(C3) • CLO3 : Use mathematical expression in describing real engineering problems precisely, concisely and logically(A3)
1	**DUE10012 COMMUNICATION ENGLISH 1**	2	NONE	**COMMUNICATIVE ENGLISH 1** focuses on developing students' speaking skills to enable them to communicate effectively and confidently in group discussions and in a variety of social interactions. It is designed to provide	• CLO1: Participate in a discussion using effective communication and social skills to reach an amicable conclusion by accommodating differing views and opinions.(A3)

				students with appropriate reading skills to comprehend a variety of texts. The students are equipped with effective presentation skills as a preparation for academic and purposes.	• CLO2: Demonstrate awareness of values and opinions embedded in texts on current issues. (A3) • CLO3: Present a topic of interest that carries identifiable values coherently using effective verbal and non-verbal communication skills.(A2)
1	**DGP10013 ELECTRICAL TECHNOLOGY**	3	NONE	**ELECTRICAL TECHNOLOGY** exposes students to concepts of basic electrical, electromagnetism and transformers. The course focuses on the different types of electrical circuits, the relationship between current and voltage including the resistance. It also provides the skills on the measuring the electrical quantities, constructing basic circuits and operation of transformer.	• CLO1: apply the basic principles and fundamentals of Electrical Technology to solve electrical circuit problems (C3, PLO1) • CLO2: measure electrical quantities using multimeter in series, parallel and series parallel circuit (P4,PLO 5)

					• CLO3: cooperate effectively to perform practical task (A2,PLO9)
1	**DGP10022 APPLIED CHEMISTRY**	2	NONE	**APPLIED CHEMISTRY** is a study of principles of general chemistry. Concept of physical chemistry topics include structure of atom, periodic table, mole concept, acid-base concepts, chemical bonding, matter, chemical equilibrium, oxidation-reduction. The importance of chemistry to many fields of science will be emphasized.	• CLO 1 :solve basic principle of physical chemistry to provide a foundation in applying chemistry concepts (C3,PLO1) • CLO 2 :apply the basic concepts of physical chemistry in solving problems related to chemical reaction (C3, PLO1) • CLO 3 :describe the application of physical chemistry relevant to engineering practice and society (A3,PLO6)

1	**DGP10031 CHEMISTRY LAB**	1	NONE	**CHEMISTRY LAB** will stress on the proper laboratory techniques, experimental procedure, the scientific method and problem-solving process skills as used in study of general chemistry. This course also help to the critical thinking skills, problem solving skills and data analysis skills of students through chemical experiments	• CLO1: Organizes report regarding to physical chemistry experiments (P3,PLO5) • CLO2 : Perform proper laboratory techniques, experimental procedure, the scientific method and problem-solving process skills as used in study of general chemistry (P4,PLO5) • CLO3 : cooperate effectively to perform practical work (A2,PLO9)

1	**DGP10152 COMPUTER AIDED DESIGN**	2	NONE	**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.	• CLO1: construct efficiently the Computer Aided Design (CAD) Software knowledge including software requirement, user interface, options feature and starting (P3, PLO3) • CLO2: construct precisely 2D engineering drawing by using Computer Aided Design (CAD) software. (P4, PLO5) • CLO3: display behaviour consistent with a positive ethic to complete work independently. (A3, PLO8)

2	**MPU23052** **SAINS TEKNOLOGI & KEJURUTERAAN DALAM ISLAM**	2	TIADA	**SAINS,TEKNOLOGI DAN KEJURUTERAAN DALAM 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.	• CLO1: Melaksanakan dengan yakin amalan Islam dalam kehidupan seharian. (A2) • CLO2: Menerangkan etika dan profesionalisme berkaitan sains teknologi dan kejuruteraan dalam Islam (A3) • CLO3: Menghubungkaitkan minda ingin tahu dengan prinsip syariah dan kaedah fiqh dalam sains, teknologi dan kejuruteraan menurut perspektif Islam. (A4)

2	**MPU23042 NILAI MASYARAKAT MALAYSIA**	2	TIADA	**NILAI MASYARAKAT MALAYSIA** membincangkan aspek sejarah pembentukan masyarakat Malaysia, nilai-nilai agama serta adat resam dan budaya masyarakat di Malaysia. Selain itu, pelajar dapat memepelajari tanggungjawab sebagai individu dan nilai perpaduan dalam kehidupan di samping cabaran-cabaran dalam membentuk masyarakat Malaysia.	• CLO1: Membincangkan sejarah dan nilai dalam pembentukan masyarakat di Malaysia. (A2) • CLO2: Menerangkan etika dan profesionalisme terhadap konsep perpaduan bagi meningkatkan semangat patriotisme masyarakat Malaysia. (A3) • CLO3: Menghubungkait minda ingin tahu dengan cabaran-cabaran dalam membentuk masyarakat Malaysia. (A4)

2	**DBM 20023 ENGINEERING MATHEMATICS 2**	3	DBM10013	**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 relates maximum, minimum and calculate the rates of changes. This course discusses integration concepts in order to strengthen student's knowledge for solving area and volume bounded region problems. In addition, students will learn application of both techniques of differentiation and integration.	•CLO1 : Use algebra and calculus knowledge to describe relationship between various physical phenomena. (C3) •CLO2 : Solve the mathematical problems by using appropriate and relevant fundamental calculus techniques. (C3) •CLO3 : Use mathematical language to express mathematical ideas and arguments precisely, concisely and logically in calculus. (A3)

2	**DGP20053 THERMODYNAMICS**	3	NONE	**THERMODYNAMICS** gives exposure in fundamental of engineering such as in unit and dimension. This course emphasizes basic thermodynamics concepts such as steam properties, non flow process, flow process, first law of thermodynamics, second law of thermodynamics, Carnot cycle, Rankine cycle and chemical equilibrium. Student will also provide knowledge and understanding of theory, concept and application of principles to solve problems related to processes in thermodynamics. This course also exposes the students to the demonstration of experiments in Thermodynamics by using the real equipment.	• CLO1 : apply the thermodynamics law and chemical equilibrium relate to process engineering (C3, PLO1) • CLO2 : organize appropriately experiments according to the Standard Operating Procedures. (P4, PLO5) • CLO3 : cooperative effectively to perform practical task. (A2, PLO9)

2	**DGP20062 PROCESS PLANT EQUIPMENT**	2	NONE	**PROCESS PLANT EQUIPMENT** provides knowledge on concepts and basic principles of plant static and rotary equipment. The course emphasis on general uses and basic operating principles of static and rotary equipment such as valve, pipe, furnace, boiler, heat exchanger, pump, compressor, turbine and internal combustion engine. Students will be introduced to the classifications, types and specific functions of the stated components above.	• CLO1 : elaborate process plant equipment according to its classification, types, function and application. (C2, PLO1) • CLO2 : perform proper procedures in operating and maintaining process plant equipment according to standard operating procedure. (P4, PLO5) • CLO3 : describe specific process plant equipment according to their functions and operating principle in a process plant. (A3, PLO12)

2	**DGP20082 FLUID MECHANICS**	2	NONE	**FLUID MECHANICS** introduce and provide knowledge of the basic principles and concepts of fluid mechanics with applications to practical engineering situations. This course will enable the students to learn about fluid properties, fluid statics and fluid dynamics. This course also exposes the students to solve fluid mechanics problems in flow system, pipe system and dimensional analysis	• CLO1: explain basic principle and concepts related to fluid mechanics in process engineering (C2, PLO1) • CLO2 : solve problems using specific equations in application of fluid processes (C3, PLO1) • CLO3 : discuss the theory of fluid mechanics and relates to its application (A2, PLO12)
2	**DGP20093 CHEMISTRY OF PETROCHEMICAL PROCESSES**	3	NONE	**CHEMISTRY OF PETROCHEMICAL PROCESSES** focuses on chemistry of various petrochemical processes. This includes chemical reaction and its derivatives of hydrocarbon. Student should be able to describe	• CLO1 : apply the principle of chemistry in petrochemical processes (C3,PLO1) • CLO2 : perform the experiments involve chemistry in petrochemical processes (P4,PLO5)

				the reaction and processes involved in transforming petroleum-based hydrocarbons into the chemicals of petrochemicals industry.	•CLO3 : explain the chemistry of various petrochemical processes in industry and daily life. (A3, PLO6)
3	**DUE30012 COMMUNICATION ENGLISH 2**	2	DUE 10012	**COMMUNICATIVE ENGLISH 2** emphasises the skills required at the workplace to describe products or services as well as processes or procedures. This course will also enable students to make and reply to enquiries and complaints.	• CLO1: Describe a product or sevice effectively by highlighting its features and characteristics that appeal to specific audience.(A3) • CLO2: Describe prosseses, procedures and instructions clearly by highlighting information of concern.(A3) • CLO3: Demonstrate effective communication and social skills in handling enquiries and complaints amicably and professionally.(A2)

3	**DBM 30033 ENGINEERING MATHEMATICS 3**	3	DBM20023	**ENGINEERING MATHEMATICS 3** exposes students to the statistical and probability concepts and their applications in interpreting data. The course also introduces 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 and Newton-Raphson methods. In order to strengthen the students in solving engineering problems, Ordinary Differential Equation (ODE) is also included. In additional, the course also discusses optimization problems by using Linear Programming. It is designed to build students' teamwork and problems solving skill.	• CLO1 : Demonstrate an understanding of the common body of knowledge in mathematics. (C3) • CLO2 : Demonstrate problems solving skills in engineering problems. (C3) • CLO3 : Use mathematical expression in describing real engineering problems precisely, concisely and logically. (A3)

3	**DGP 30102 PROCESS INSTRUMENTATION AND CONTROL**	2	NONE	**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 valve, transmitter, converter and controller. Students will understand the basic principle for control system and its usage according to petrochemical plant situation.	• CLO1 : Explain the fundamental of the process control system, measurement and working principle of instrument used in process plant (C2, PLO1) •CLO2 : Solve the measurement and basic process control system applied in process plant (C3, PLO1) •CLO3 : Practice the process controller, plant instrumentation equipment and safety interlock system used in the process plant (A2, PLO12)

3	**DGP 30111 PROCESS INSTRUMENTATION AND CONTROL LAB**	1	NONE	**PROCESS INSTRUMENTATION AND CONTROL LAB** provides knowledge integrated with technical skills for using 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 valve, transmitter, converter and controller. Students will handle the basic principle for control system and its usage according to petrochemical plant situation	• CLO1 : Explain the measurement of process variable in the process plant. (P2, PLO4) • CLO2 : Measures the plant equipment variables and basic process control system applied in process plant. (P3,PLO5) • CLO3 : Relate the continuous learning on basic principle for control system to achieve goal during laboratory works. (A4,PLO9)

3	**DGP30122 HEAT TRANSFER**	2	DGP20053	**HEAT TRANSFER** emphasize 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.	CLO1 : apply the engineering principles and basic mechanism of heat transfer in steady state condition (C3, PLO1) • CLO2 : solve engineering calculations for problems involving heat transfer and thermal exchanges system (C3, PLO1) • CLO3 : justify using knowledge of heat transfer through its application (A3, PLO12)

3	**DGP30132 MASS AND ENERGY BALANCE**	2	DGP10022	**MASS AND ENERGY BALANCE** is designed as an introduction to fundamentals of material and energy balances. The emphasis is on understanding the principles of material and energy balances in chemical process systems. This course will develop the student's ability to formulate and solve material and energy balances problems for chemical process systems.	• CLO1: apply the basic principle of engineering calculation involving material and energy balance in engineering process systems (C3,PLO1) • CLO2: solve material and energy balance problems for processes with or without chemical reaction in chemical process systems (C3, PLO1) • CLO3: practice the principles and techniques of solving problems involving material and energy balance in chemical process industry (A2, PLO9)

3	**DGP30041 PIPING AND INSTRUMENTATION DIAGRAM WORKSHOP**	1	NONE	**PIPING AND INSTRUMENTATION DIAGRAM (P&ID)** provides knowledge on recognize symbols used in process flow diagram including equipment, piping and instrument. This course also provides skill practice in reading piping and instrumentation diagram on process actual to enable students read P&ID in industry during working.	• CLO1: recognize the design of symbols and type of processes of a flow diagram (P2, PLO3) • CLO2: recognize appropriate piping identification system, instruments and control system of a flow diagram in the plant operation (P2, PLO5) • CLO3: contribute idea clearly during performing task given in reading piping and instrumentation diagram (A2,PLO9)

3	**DGP 30162 PROCESS ENGINEERING LAB 1**	2	NONE	**PROCESS ENGINEERING LAB 1** provides practical skills through simulation and workshop conducted based on concepts and theories learned in class. The emphasis of the module is to introduce students to process application in fluid mechanics and heat transfer.	• CLO1: perform practical works in fluid mechanics process application (P4, PLO5) • CLO2: organizes appropriately experiment in heat transfer process according to the standard operation procedures (P4, PLO5) • CLO3: participate actively and built teamwork in group members to perform laboratory work (A2, PLO9)
4	**DJJ40132 ENGINEERING AND SOCIETY**	2	NONE	**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	• CLO1: Implement the roles of engineering profession towards the developing of society and its challenges in globalization (C3) • CLO2: Determine the important of work ethics, bylaws and professionalism in

				introduction and green engineering	engineering profession. (C4) • CLO3 : Determine the needs for sustainable and green engineering towards providing the solutions in engineering field. (C4)
4	**DGP40172 PROCESS ENGINEERING LAB 2**	2	NONE	**PROCESS ENGINEERING LAB 2** provides practical skills through experiments conducted based on concepts and theories learned in class. In this course, skills for accurate data collection, analysis and team working are developed. Students learn to operate equipment and modern instrumentation with precision. The emphasis of the course is to practice the start-up procedure of the chemical process equipment.	• CLO1: Complete laboratory procedure relating to separation process (P4, PLO4) • CLO2: Perform appropriate techniques in handling process engineering equipment (P4, PLO5) • CLO3: Contribute idea clearly in performing task given during laboratory work. (A2, PLO9)

4	**DGP40182 PROJECT 1**	2	NONE	**PROJECT 1** provides knowledge on the implementation methods and project production based on the hardware or analysis from laboratory test or research data / information. This course provides exposure to the selection and initial project planning, preparation methods, presentation proposals and production projects. This course also prepare the knowledge and training skills to solve problems and decision making before going into the nature of employment in the future.	• CLO1 : Outline the project planning process (C2,PLO2) • CLO2 : Prepare a technical project proposal conform to the standard report format (C3,PLO4) • CLO3 : Perform the project activities as listed in project planning (P4,PLO5) • CLO4 : Perform verbal presentation of the proposed project (A2,PLO11)

4	**DGP40192 UTILITY PLANT**	2	NONE	**UTILITY PLANT** introduces 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 function, the basic design, the philosophy of control and interlock including the main equipment, functions, mechanical characteristics and its operating procedures. This course also imparts general knowledge and exposes the students with common problems utility plant	• CLO1 : Explain the function and process flow of each system involved in utility plant. (C2,PLO3) • CLO2 : Demonstrate the process flow of each system involved in utility plant. (C3,PLO6) • CLO3 : Describe the problems and treatments in each process involved in utility plant (A3,PLO7)

4	**DGP40202 POLLUTION CONTROL IN PETROCHEMICALS INDUSTRY**	2	NONE	**POLLUTION CONTROL IN PETROCHEMICALS INDUSTRY** focuses on the understanding the types of pollution such as air pollution, water pollution, solid wastes and hazardous wastes in petrochemicals industry. Students will be able to explain the impact of environmental pollution and have an understanding of the procedures to control or prevent environmental pollution in petrochemicals industry. Student should be able to demonstrate awareness to improve environmental quality and maintain sustainability	• CLO1 : Carry out the impact of environmental pollution in petrochemicals industry. (C3,PLO1) • CLO2 : Practice the procedures to control and prevent Environmental pollution in Petrochemicals industry. (C3,PLO6) • CLO3 : Demonstrate awareness and consideration to improve quality of environment and maintain sustainability. (A3,PLO7)

4	**DGP40213 PETROCHEMICAL PROCESS TECHNOLOGY**	3	NONE	**PETROCHEMICAL PROCESS TECHNOLOGY** provides exposure to the principles of separation processes involved in oil and gas processing plant in relationship with petrochemical industry. This course also provides exposure to the various processing technology carried out in petrochemical plants. The students will be able to learn the processes involved in the production of petrochemical products and thus can complete process flow diagram.	• CLO1 : carry out the principles of separation processes and chemical reactions involved in the plants (C3, PLO3) • CLO2 : complete the flow diagram of the processing plants (C3, PLO6) • CLO3: discuss the function of processing units and the mechanical characteristics of major equipment used in the processing units effectively (A2,PLO10)

4	**DGP40222 REACTOR IN PETROCHEMICALS INDUSTRY**	2	NONE	**REACTOR IN PETROCHEMICALS INDUSTRY** provides exposure to the knowledge of the most important types of reactors applied in the petrochemicals industry. This course also applied to the characteristics of reactor types. The students will be able to explain the application of reactors in petrochemicals industry.	• CLO1 : apply various types of reactor in petrochemicals industry (C3, PLO1) • CLO2 : analyze the characteristics of reactor types use in petrochemicals industry (C4, PLO3) • CLO3 : explain independently the application of reactors in petrochemicals industry (A3, PLO12)
5	**MPU21032 PENGHAYATAN ETIKA DAN PERADABAN**	2	TIADA	**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	• CLO1: Membentangkan konsep etika dan peradaban dalam kepelbagaian tamadun. (A2) • CLO2: Menerangkan sistem, tahap perkembangan, kesepaduan sosial dan kebudayaan

				dalam mengukuhkan kesepaduan sosial. Selain itu, perbincangan dan perbahasan berkaitan isu-isu kontemporari dalam aspek ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etiks fsn peradaban dapat melahirkan pelajar yang bermoral dan profesional. Penerapan amalan pendidikan berimpak tinggi (HIEPs) yang bersesuaian digunakan dalam penyampaian kursus ini.	merentas bangsa di Malaysia. (A2) • CLO3: Mencadangkan sikap yang positif terhadap isu dan cabaran kontemporari dari perspektif etika dan peradaban. (A3)
5	**DUE50032 COMMUNICATIVE ENGLISH 3**	2	DUE30012	**COMMUNICATIVE ENGLISH 3** aims to develop the necessary skills in students to analyse and interpret graphs and charts from data collected as well as job hunting mechanics. Students will learn the process of job	• CLO1: Describe and analyze information contained in graphs and charts clearly and accurately based on a mini project. (A3)

				hunting which includes job search strategies and making enquiries. They will also learn to write resumes and cover letters. The students will develop skills to introduce themselves, highlight their strengths and abilities, present ideas, express opinions and respond appropriately during job interviews.	• CLO2: Write an effective resume and a supporting cover letter for a relevant job opening. (C3) • CLO3: Handle a job interview effectively and confidently. (C3)
5	**MPU22012 ENTREPRENEUSHIP**	2	NONE	**ENTREPRENEUSHIP** focuses on the fundamentala and concept of entrepreneuship in order to inculcate the value and interest in students to choose entrepreneuship as a career. This course can help students to initiate creative and innovative entrepreneurial ideas. It also emphasizes a preparation of	• CLO1: Propose the value proposition of entrepreneurial idea using Business model Canvas. (A3) • CLO2: Develop a viable business plan by organizing business objectives according to priorities. (A4) • CLO3:

				business plan framework through business model canvas.	Organise the online presence business in social media marketing platform. (A3)
5	**DGP50232 PROCESS ENGINEERING LAB 3**	2	NONE	**PROCESS ENGINEERING LAB 3** provides practical skills through plant operation workshop and simulation conducted based on concepts and theories learned in class. The emphasis of this course is to perform the mini plant exercise, boiler simulation exercise and boiler operation exercise.	CLO1 : follow procedures of mini plant exercises during practical works involved in petrochemical technology (P3, PLO5) CLO2 : perform practical works relating to boiler simulation exercises and boiler operation exercises involved in petrochemical technology (P4, PLO5) CLO3: participate actively in group members to comply the given laboratory exercises (A2, PLO9)

5	**DGP50242 PROJECT 2**	2	DGP40182	**PROJECT 2** is emphasized on the method of construction, testing, detection and project preparation planned in the previous semester (DGP40182: Project 1). This course also trains students to prepare project reports accordance with prescribed format and performing projects through the semester	• CLO1 : Displays design thinking and design solution for complex engineering problems through final report (P3, PLO 3) • CLO2 : Performs appropriate preparation techniques for project activities using research based-knowledge and research method (P4, PLO 5) • CLO3 : Participate effectively as a member in a team through presentation (A2, PLO 9) • CLO4 : Demonstrate knowledge of project management and finance through presentation

					(A3, PLO 11)
5	**DGP50253 PETROCHEMICAL PRODUCTION PROCESSES**	3	NONE	**PETROCHEMICAL PRODUCTION PROCESSES** provides exposure to the basic processes involved in petrochemical processing plant. This course also provides exposure to the various processing technology carried out in petrochemical plants. The students will be able to learn the processes involved in the production of petrochemical products and thus can complete process flow diagram	• CLO1 : examine the various processes and reactions in the plants (C3, PLO1) • CLO2 : complete the flow diagrams of the processing plants (C3, PLO3) • CLO3 : discuss effectively the functions of equipment in processing plant (A2, PLO10)
5	**DGP50263 PETROCHEMICAL POLYMER**	3	NONE	**PETROCHEMICAL POLYMER** consists of two parts where part 1 focuses on theoretical knowledge on the basic polymer and plastic classification. Plastic is divide into	• CLO 1 : Carry out the types of polymer and the method of producing plastic (C3,PLO1)

				two group thermoplastic and thermoset. For parts two, plastic production process consists of injection moulding, blow moulding, thermoforming, compression and transfer moulding.	• CLO 2 : Apply specific method to find degree of polymerization, molecular weight and mole fraction of copolymer (C3,PLO2) • CLO 3 : Describe the plastic production process and related to environmental aspects (A3,PLO7)
5	**DGP50272 PETROCHEMICAL SYNTHESIS PRODUCT LAB**	2	NONE	**PETROCHEMICAL PRODUCT SYNTHESIS LAB** provides practical skills through experiments conducted based on concepts and theories learned in class. In this course, skills for accurate data collection and analysis are developed while promoting environmental and sustainability issue. Students learn to operate equipment and	• CLO1: Measure properties of product in petrochemical industry (P4, PLO2) • CLO2: Perform process related to petrochemical product synthesis (P4, PLO5) • CLO3: Discuss product sustainability based on economy and

				modern instrumentation with precision. The emphasis of the course is to practice the start-up procedure of the chemical process equipment by following safety measure	environmental pillar (A2, PLO7)
ELECTIVE	**DGP42012 ADVANCED CONTROL PROCESSES**	2	NONE	**ADVANCED CONTROL PROCESSES** provides knowledge of the basic concept of process control system. Exposure to use mathematical tools and techniques to model and solve the process control system problem. Students will understand the engineering principles underlying process dynamics and control applied in process plant	• CLO1 : Explain the concept and knowledge of process control system to solve the problem related to process plant. (C3,PLO2) • CLO2 : Apply mathematical tools and techniques to model the process control system and suitable use of PID control in process plant. (C3,PLO8) • CLO3 : Present the control system in petrochemical process. (A2,PLO10)

ELECTIVE	**DGP42022 PETROLEUM TECHNOLOGY**	2	NONE	**PETROLEUM TECHNOLOGY** provides the knowledge on concepts and principles of petroleum and processes. It emphasizes on the basic methods and techniques in petroleum covering the following items; geology of petroleum, drilling operations, offshore platform production facilities and plant operations.	• CLO1: Carry out the concepts and principles of geology of petroleum. (C3,PLO2) • CLO2: Demonstrate the processes of drilling operations, offshore platform production facilities and plant operations. (C3,PLO8) • CLO3: Describe the function of main systems in drilling operations. (A3,PLO10)
ELECTIVE	**DGP52032 INDUSTRIAL MANAGEMENT**	2	NONE	**INDUSTRIAL MANAGEMENT** provides students with a strong fundamental understanding of industrial management prospect and production system planning such as inventory, scheduling, production system	•CLO 1: Apply the principles and elements of management concept, quality managements and human resources management in the industrial sector. (C3,PLO2)

				operation, facilities, plan location, layout and line balancing. This course also provides knowledge in quality control and human resource management.	•CLO 2: Calculate the elements of plant location, layout and line balancing, Inventory control management and scheduling management. (C3,PLO8) •CLO 3: Describe the quality management practice in the industry. (A3,PLO10)
ELECTIVE	**DGP52042 WASTE WATER ENGINEERING**	2	NONE	**WASTEWATER ENGINEERING** focuses on characteristics of wastewater and treatment technologies that been used in industries. This course give exposure to the student on current environmental situation and the need to protect the environment for future generation. The topics cover on	• CLO1: Identify constituent of wastewater and analysis of wastewater flowrate and mass loading (C1,PLO2) • CLO2: Understand and elaborate the common physical, chemical and biological unit operations

				regulation and policies, characterization of wastewater, theory and fundamental of wastewater treatment process and sustainability towards the environment.	encountered in treatment processes. (C2,PLO8) • CLO3: Discuss the need of wastewater treatment to the ecosystem (A2,PLO10)

DIPLOMA KEJURUTERAAN ELEKTRIK DAN INSRUMENTASI (PETROKIMIA) (DEI)

DIPLOMA KEJURUTERAAN ELEKTRIK DAN INSTRUMENTASI

INTRODUCTIONS

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. The Eleventh Malaysia Plan was drawn to produce 60% out of 1.5 million workers was in TVET sector. Until now a total of 69,475 (51%) of the 136,062 technical education and vocational training (TVET) graduates in Malaysia are working as professionals and skilled workers. 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 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 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)

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

PEO1: equipped with industry-relevant knowledge and skills in process engineering field

PEO2: engaging on lifelong and continuous learning to enhance knowledge and skills

PEO3: instilled with entrepreneurial skills and mind set in the real working environment

PEO4: established strong linkage 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 specialization as specified in DK1 to DK4 respectively to wide practical procedures and practices

PLO2: identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity (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, cultural, societal, and environmental considerations (DK5)

PLO4: conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements

PLO5: apply appropriate techniques, resources, and modern engineering and IT tools to well-defined engineering problems, with an awareness of the limitations (DK6)

PLO6: demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technician practice and solutions to well-defined engineering problems (DK7)

PLO7: understand and evaluate the sustainability and impact of engineering technician work in the solution of well-defined engineering problems in societal and environmental contexts (DK7)

PLO8: understand and commit to professional ethics and responsibilities and norms of technician practice

PLO9: function effectively as an individual, and as a member in diverse technical teams

PLO10: communicate effectively 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

PLO11: demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member or leader in a

technical team and to manage projects in multidisciplinary environments

PLO12: recognise the need for, and have the ability to engage in independent updating in the context of specialised technical knowledge

PROGRAMME STRUCTURE (SEM 1- SEM 6)

Components	Course Code	Course	L	P	T	O	Credit Value
SEMESTER 1							
Compulsory	DUE10012	Communicative English 1	1	0	2	0	2
	MPU24XX1	Sukan	0	2	0	0	1
	MPU24XX1	Unit Beruniform 1	0	2	0	0	
Common Core	DBS10012	Engineering Science	2	1	0	0	2
	DBM10013	Engineering Mathematics 1	2	0	2	0	3
Discipline Core	DGI10013	Electric Circuits I	2	2	0	0	3
	DGI10022	Electrical Wiring	0	4	0	0	2
	DGI10033	Measurement	2	2	0	0	3
		TOTAL	**24**				**16**
SEMESTER 2							
Compulsory	MPU23052	Sains, Teknologi dan Kejuruteraan Dalam Islam*	1	0	2	0	2
	MPU23042	Nilai Masyarakat Malaysia**	1	0	2	0	
	MPU24XX1	Kelab/Persatuan	0	2	0	0	1
	MPU24XX1	Unit Beruniform 2	0	2	0	0	
Common Core	DBM20023	Engineering Mathematics 2	2	0	2	0	3
Discipline Core	DGI20043	Electric Circuits II	2	2	0	0	3
	DGI20053	Electronics	2	2	0	0	3
	DGI20063	Digital Electronic	2	2	0	0	3
	DGM10022	Engineering Drawing	1	3	0	0	2
		TOTAL	**25**				**17**
SEMESTER 3							
Compulsory	DUE30022	Communicative English 2	1	0	2	0	2
Common Core	DBM30043	Electrical Engineering Mathematics	2	0	2	0	3
Discipline Core	DGM10032	OSH in Petrochemical Engineering	2	0	0	0	2
	DGP10042	Piping & Instrumentation Diagram	2	0	0	0	2
	DGI30073	Electrical Machine &	2	2	0	0	3
	DGI30083	Instrumentation	2	2	0	0	3
	DGI30093	Power System	2	2	0	0	3
		TOTAL	**23**				**18**
SEMESTER 4							
Common Core	DJJ40132	Engineering and Society	2	0	0	0	2
Discipline Core	DGI40103	Control System	2	2	0	0	3
	DGI40113	PLC Technology	2	2	0	0	3
	DGM20053	Petrochemical Technology	2	2	0	0	3

	DGM40092	Project 1	1	2	0	0	2
	DGC40063	Plant Utilities	2	2	0	0	3
		Elective***					
		TOTAL	**21**				**16**
SEMESTER 5							
Compulsory	MPU21032	Penghayatan Etika dan Peradaban	1	0	2	0	2
	DUE50032	Communicative English 3	1	0	2	0	2
	MPU22012	Entrepreneurship	1	0	2	0	2
Discipline Core	DGM5012	Project 2	0	5	0	0	3
	DGI50143	Process Instrumentation	2	2	0	0	3
	DGI50153	Power Electronic	2	2	0	0	3
		Elective***					
		TOTAL	**22**				**15**
		Elective***					
Elective	DGI40122	Embedded Robotic	2	0	2	0	2
	DGI40132	C Programming					
SEMESTER 6							
Industrial Training	DUT600610	Engineering Industrial Training	0	0	0	0	10
		TOTAL	**0**				**10**

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

SEMESTER	COURSE	CREDIT	PREREQUISITE	SYNOPSIS	CLO
1	DUE10012 COMMUNICATION ENGLISH 1	2	NONE	**COMMUNICATIVE ENGLISH 1** focuses on developing students' speaking skills to enable them to communicate effectively and confidently in group discussions and in a variety of social interactions. It is designed to provide students with appropriate reading skills to comprehend a variety of texts. The students are equipped with effective presentation skills as a preparation for academic and purposes.	• CLO1: Participate in a discussion using effective communication and social skills to reach an amicable conclusion by accommodating differing views and opinions.(A3) • CLO2: Demonstrate awareness of values and opinions embedded in texts on current issues.(A3) • CLO3: Present a topic of interest that carries identifiable values coherently using effective verbal and non-verbal communication skills.(A2)

1	**DBS 10012 ENGINEERING SCINECE**	2	NONE	**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.	• CLO1 : Use basic physics concept to solve engineering physics problems (C3, CLS 1) • CLO2 : Apply knowledge of fundamental physics in activities to mastery physics concept (C3, CLS 1) • CLO3 : Perform appropriate activities related to physics concept (P3, CLS 3a)
1	**DBM 10013 ENGINEERING MATHEMATICS 1**	3	NONE	**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	• CLO1 : Use mathematical statement to describe relationship between various physical phenomena. (C3 , CLS 1) • CLO2 : Show mathematical solutions using the appropriate techniques in mathematics. (C3 , CLS 3c) • CLO3 : Use mathematical expression in

				matrices involving 3x3 matrix.	describing real engineering problems precisely, concisely and logically. (A3 , CLS 3b)
1	**DGI10013ELECTRIC CIRCUITS I**	3	NONE	**ELECTRIC CIRCUITS I** introduces students to the fundamentals of DC electrical circuits. It covers the basic laws, theorems and circuit techniques. This course also covers energy stored element in the circuits.	• CLO1 : apply the principles and concept of DC electrical circuit using different method and approach (C3, PLO1) • CLO2 : construct the laboratory activities of DC electrical circuit using appropriate electrical equipment. (P3, PLO5) • CLO3 : demonstrate the ability to work in team to complete assigned tasks. (A3, PLO9)
	DGI10022 ELECTRICAL WIRING	2	NONE	**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	• CLO1 : follow the concept and principles of electrical safety and wiring in electrical wiring according to NIOSH and MS IEC 60364 (P3, PLO5)

1				course provides the students with the knowledge and skill in doing different types of wiring installation, inspection and testing.	• CLO2 : perform single-phase domestic wiring, wiring inspection & testing and wiring protection according to MS IEC 60364 (P4, PLO4) • CLO3 : demonstrate ability to apply sustainable practices for inspection and wiring test in the context of local and global work and social environment (A3, PLO8)
1	**DGI10033 MEASUREMENT**	3	NONE	**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	• CLO1 : apply the concept of measurement principles and measuring equipment in electrical and electronic measurement (C3, PLO1) • CLO2 : construct meter calibrating and measuring technique using the correct measuring equipment

				session. This course also covers the basic concept and simple application of DC Bridge.	(P3, PLO5) • CLO3 : demonstrate good written communication through essay writing in a group on assigned topics within a stipulated time frame (A3, PLO10)
2	**MPU23052 SAINS TEKNOLOGI & KEJURUTERAAN DALAM ISLAM**	2	TIADA	**SAINS,TEKNOLOGI DAN KEJURUTERAAN DALAM 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.	• CLO1: Melaksanakan dengan yakin amalan Islam dalam kehidupan seharian. (A2) • CLO2: Menerangkan etika dan profesionalisme berkaitan sains teknologi dan kejuruteraan dalam Islam (A3) • CLO3: Menghubungkaitkan minda ingin tahu dengan prinsip syariah dan kaedah fiqh dalam sains, teknologi dan kejuruteraan menurut perspektif Islam. (A4)

2	**MPU23042 NILAI MASYARAKAT MALAYSIA**	2	TIADA	**NILAI MASYARAKAT MALAYSIA** membincangkan aspek sejarah pembentukan masyarakat Malaysia, nilai-nilai agama serta adat resam dan budaya masyarakat di Malaysia. Selain itu, pelajar dapat memepelajari tanggungjawab sebagai individu dan nilai perpaduan dalam kehidupan di samping cabaran-cabaran dalam membentuk masyarakat Malaysia.	• CLO1: Membincangkan sejarah dan nilai dalam pembentukan masyarakat di Malaysia. (A2) • CLO2: Menerangkan etika dan profesionalisme terhadap konsep perpaduan bagi meningkatkan semangat patriotisme masyarakat Malaysia. (A3) • CLO3: Menghubungkait minda ingin tahu dengan cabaran-cabaran dalam membentuk masyarakat Malaysia. (A4)
1	**MPU21032 PENGHAYATAN ETIKA DAN PERADABAN**	2	TIADA	**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	• CLO1: Membentangkan konsep etika dan peradaban dalam kepelbagaian tamadun. (A2) • CLO2: Menerangkan sistem, tahap perkembangan, kesepaduan sosial

				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 etiks fsn peradaban dapat melahirkan pelajar yang bermoral dan profesional. Penerapan amalan pendidikan berimpak tinggi (HIEPs) yang bersesuaian digunakan dalam penyampaian kursus ini.	dan kebudayaan merentas bangsa di Malaysia. (A2) • CLO3: Mencadangkan sikap yang positif terhadap isu dan cabaran kontemporari dari perspektif etika dan peradaban. (A3)
2	**DBM 20023 ENGINEERING MATHEMATICS 2**	3	DBM10013	**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 relates maximum, minimum and calculate the rates of changes. This course discusses integration concepts in order to strengthen student's knowledge for solving area and volume bounded region problems. In addition,	• CLO1 : Use algebra and calculus knowledge to describe relationship between various physical phenomena. (C3, CLS 1) • CLO2 : Solve the mathematical problems by using appropriate and relevant fundamental calculus techniques. (C3, CLS 3c)

				students will learn application of both techniques of differentiation and integration.	• CLO3 : Use mathematical language to express mathematical ideas and arguments precisely, concisely and logically in calculus. (A3 , CLS 3b)
2	**DGI20043 ELECTRIC CIRCUITS II**	3	DGI10013	**ELECTRIC CIRCUITS II** is designed to continue the subject delivered in ELECTRIC CIRCUITS I in providing the students with the knowledge of electrical circuits. It emphasizes the principles of an alternating current AC waveform, complex number and sinusoidal steady-state circuit analysis.	• CLO1 : carry out AC circuit concept and analysis using AC circuit law(C3,PLO1) • CLO2 : construct the laboratory activities of AC electrical circuit using appropriate electrical equipment (P3, PLO5) • CLO3 : demonstrate the ability to work in team to complete assigned tasks (A3, PLO9)
	DGI20053 ELECTRONICS	3	NONE	**ELECTRONICS** course is an introduction to the basic electronic theories and devices. This course covers the fundamental of electronic devices which	• CLO1 : apply the characteristic and application of semiconductor devices based on

2				includes diodes, bipolar junction transistors (BJTs), field effect transistor (FETs) and Operational Amplifiers (Op-Amps). The contents encompass devices structure, circuit configurations, operations and its applications.	the schematic diagrams (C3,PLO1) • CLO2 : construct semiconductor devices application circuits based on schematic diagrams (P3,PLO5) • CLO3 : demonstrate the ability to work in team to complete assigned tasks (A3,PLO9)
2	**DGI20063 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.	• CLO1 : implement the various number system codes, logic gates , boolean algebra and Karnaugh Map to construct the combinational or sequential logic circuits (C3,PLO1) • CLO2 : perform the design of logic diagrams (P4,PLO5)

					• CLO3 : demonstrate the ability to work in team to complete assigned tasks (A3,PLO9)
2	**DGM10022 EMGINEERING DRAWING**	2	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 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,	• Apply the basic fundamentals of engineering drawing in comply to related problems. (C3, PLO1) • Construct engineering drawings according to the required standards and using fundamental features of CAD software. (P4, PLO 4) • Demonstrate the understanding of engineering norms and practices in engineering drawing. (A3, PLO 8)

				dimensioning,hatching and plotting.	
3	**DUE30022 COMMUNICATION ENGLISH 2**	2	DUE10012	**COMMUNICATIVE ENGLISH 2** emphasises the skills required at the workplace to describe products or services as well as processes or procedures. This course will also enable students to make and reply to enquiries and complaints.	• CLO1: Describe a product or sevice effectively by highlighting its features and characteristics that appeal to specific audience(A3) • CLO2: Describe prosseses, procedures and instructions clearly by highlighting information of concern.(A3) • CLO3: Demonstrate effective communication and social skills in handling enquiries and complaints amicably and professionally.(A2)
3	**DBM 30043 ELECTRICAL ENGINEERING**	3	DBM20023	**ELECTRICAL ENGINEERING MATHEMATICS** exposes students to the statistical and probability concepts and their applications in interpreting data. The course also introduces	• CLO1 : Demonstrate an understanding of the common body of knowledge in mathematics (C3,CLS 1)

				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 Raphson method. In additional, the course also discuss Ordinary Differential Equation (ODE). In order 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.	• CLO2 : Demonstrate problems solving skills in engineering problems (C3, CLS 3c) • CLO3 : Use mathematical expression in describing real engineering problems precisely, concisely and logically (A3,CLS 3b)
3	**DGM10032 OSH IN PETROCHEMICAL ENGINEERING**	2	NONE	**OSH IN PETROCHEMICAL ENGINEERING** course is designed to impart understanding of the self-regulatory concepts and provisions under the Occupational Safety & Health Act (OSHA). This course presents the responsibilities of employers and employees in	• CLO1: Identify the OSH legislation and its compliance in Malaysia. (C1, PLO1). • CLO2 : Explain briefly incident hazards, risks and safe work practices in order to maintain health and

				implementing and complying with the safety procedures at work. This course provide an understanding of the key issues in OSH management, incident prevention, Emergency Preparedness and Response (EPR), fire safety, occupational first aid, Hazard Identification, Risk Assessment and Risk Control (HIRARC), plant safety and guide the students gradually into this multi-disciplinary science.	safe work environment. (C2, PLO1). • CLO3 : Adhere to the safety procedures in respective fields. (A3, PLO8).
3	**DGI30073 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.	• CLO1 : show the construction, operation and controlling methods of DC and AC machines (C3,PLO1) • CLO2 : perform the controlling methods for DC and AC machines (P4, PLO5)

					• CLO3 : demonstrate the ability to work in team to complete assigned tasks (A3, PLO9)
	DGI30083 INSTRUMENTATION	3	NONE	**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.	• CLO1 : apply the principle of pneumatic, hydraulic and process instrument in process control (C3,PLO1) • CLO2 : perform pneumatic, hydraulic and process instrument in process control (P4,PLO5) • CLO3 : demonstrate team working efficiently while doing practical work (A3,PLO9)
3	**DGI30093 POWER SYSTEM**	3	NONE	**POWER SYSTEM** provides knowledge for 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. This course also provides skills training focus on the	• CLO1: apply the knowledge of power system and fault calculation. (C3, PLO1) • CLO2 : Perform practical work on power system using

				three phase system, transformer and also distribution system.	appropriate equipment. (P4, PLO5) • CLO3 : Study the importance of the environmental friendly power generation through group discussion. (A3, PLO7)
3	**DGP10042 PIPING AND INSTRUMENTATION DIAGRAM**	2	NONE	**PIPING AND INSTRUMENTATION DIAGRAM (P&ID)** provides knowledge on sketches and sketching of symbols used in process flow diagram. This course also provides knowledge and skill practice in developing process networks in piping and instrumentation diagram	• CLO1 : explain the symbols and processes of a flow diagram (C2) • CLO2 : draw the symbols and the control system of a flow diagram in the plant operation (C3) • CLO3 : study the plant operations of piping and instrumentation diagram (A3)

4	**DJJ40132 ENGINEERING AND SOCIETY**	2	NONE	**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	• CLO1: Implement the roles of engineering profession towards the developing of society and its challenges in globalization (C3) • CLO2: Determine the important of work ethics, bylaws and professionalism in engineering profession. (C4) • CLO3 : Determine the needs for sustainable and green engineering towards providing the solutions in engineering field. (C4)
4	**DGI40103 CONTROL SYSTEM**	3	NONE	**CONTROL SYSTEMS** introduce 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	• CLO1 : determine the concept and principles of control system fundamental and engineering problems mathematically using appropriate techniques. (C4, PLO2) • CLO2 :

				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.	perform the ability to handle control system equipment using proper techniques and procedures (P4, PLO5) • CLO3 : demonstrate effectively as a part of team while doing practical work based on related procedures (A3, PLO9)
4	**DGI 40113 PLC TECHNOLOGY**	3	NONE	**PLC TECHNOLOGY** provides knowledge on application of PLC to the automation and process control of plants and factories as well as DCS systems. The course emphasizes the fundamentals of PLC hardware and software, design process, programming and maintenance methods. This course also provides the concept and practical applications of the modern Distributed Control System (DCS).	• CLO1 : determine the operation of PLC and DCS, simple automation sequential control and process plant control system based on PLC technology (C4,PLO2) • CLO2 : perform the programming, troubleshooting and maintenance for PLC system using appropriate equipment (P4, PLO5)

					• CLO3 : demonstrate effectively as a part of team while doing practical work based on related procedures (A3, PLO9)
4	**DGM20053 PETROCHEMICAL TECHNOLOGY**	**3**	NONE	**PETROCHEMICAL TECHNOLOGY** provides exposure to the basic processes involved in oil and gas processing plant and also petrochemical plant. This 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.	• CLO 1 : Explain the properties of petroleum and basic operations of petroleum productions (C2, PLO1) • CLO 2 : Classify the common process flow diagram of gas processing plant, refinery and petrochemical plant (C3,PLO2) • CLO 3 : Perform main functions and process flow of every plants involved in petroleum production (A2, PLO5)

4	**DGM40092 PROJECT 1**	2	NONE	**PROJECT 1** introduces students with the ability and skills in planning and managing an innovative solutions 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	• CLO1 : Document an effective technical project proposal to solve well-defined problems in the related engineering field. (C4, PLO3) • CLO2 : Organize an investigation of well-defined problems to provide an innovative and creative solutions for selected engineering research project. (P4, PLO4) • CLO3 : Relate knowledge and developed skills to manage the project. (A4, PLO11)

4	**DGC40043 PLANT UTILITIES**	3	NONE	**PLANT UTILITIES** introduces 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 function, calculations, the basic design, the main equipment involved, functions, mechanical characteristics and its operating procedures. During this course, the student will also be exposed into practical skills regarding utility plant operations and maintenance through practical works.	• CLO1: Apply the function, process flow and basic calculation involved in utility plant system. (C3, PLO1) • CLO2: Perform practical tasks relating to utility plant operation (P4, PLO5) • CLO3: Demonstrate societal awareness towards sustainable environment (A3, PLO7)
5	**MPU21012 PENGAJIAN MALAYSIA**	2	TIADA	**PENGAJIAN MALAYSIA** membincangkan sejarah dan politik, perlembagaan Malaysia, kemasyarakatan dan perpaduan, pembangunan negara dan isu-isu keprihatinan negara. Kursus ini adalah bertujuan untuk melahirkan graduan yang mempunyai identiti kebangsaan dan semangat patriotisme yang unggul.	• CLO1: Menerangkan nilai sejarah bangsa dan negara di Malaysia. (A3) • CLO2: Menghubungkait sikap dan tanggungjawab yang signifikan dengan sistem pemerintahan negara. (A4) • CLO3: Membentuk minda ingin tahu menerusi

					aktiviti kemasyarakatan atau patriotisme dalam kalangan pelajar. (C3)
5	**DUE50032 COMMUNICATION ENGLISH 3**	**2**	**DUE30022**	**COMMUNICATIVE ENGLISH 3** aims to develop the necessary skills in students to analyse and interpret graphs and charts from data collected as well as job hunting mechanics. Students will learn the process of job hunting which includes job search strategies and making enquiries. They will also learn to write resumes and cover letters. The students will develop skills to introduce themselves, highlight their strengths and abilities, present ideas, express opinions and respond appropriately during job interviews.	• CLO1: Describe and analyze information contained in graphs and charts clearly and accurately based on a mini project. (A3) • CLO2: Write an effective resume and a supporting cover letter for a relevant job opening. (C3) • CLO3: Handle a job interview effectively and confidently. (C3)

5	**DPB2012 ENTREPRENEUSHIP**	2	NONE	**ENTREPRENEUSHIP** focuses the principles and concept of entrepreneuship. This course concentrates on the systematic methods of getting business ideas. This course also prepares students on conducting online business using social media marketing. It also emphasizes a preparation of business plan and developing their entrepreneurial skills.	• CLO1: Explain clearly the concept of entrepreneuship and process of developing an effective business. (C2) • CLO2: Prepare completely a business plan according to standard format. (P2) • CLO3: Build the online business presence using the social media marketing. (A4)
5	**DGM50123 PROJECT 2**	**3**	DGM40092	**PROJECT 2** introduces the students to the concepts of conducting a design or case study. The students select a project, list the project's needs, the processes involved, cost estimation, project schedule by applying appropriate methodology in the project planning. It also involves project implementation, project report and presentation.	• CLO 1 : Design creative solution to solve the problems in the project or case study (C5, PLO2) • CLO2 : Construct the selected design or case study based on the project or case study planning and design. (P5, PLO4)

					• CLO3 : Demonstrate awareness of management, business practices and entrepreneurship related to product of project. (A3, PLO9) • CLO4: Demonstrate awareness of social and environment responsibility in practical work procedure and practices. (A3, PLO10)
5	**DGI50143 PROCESS INSTRUMENTATION AND CONTROL**	3	DGI40103	**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 valve, transmitter, converter and controller. Students will understand	• CLO1: determine the fundamental of process control system, measurement and working principle of plant equipments used in the process plant. (C4,PLO2) • CLO2: perform the measurement and basic process control system applied in

				the basic principle for control system and its usage according to petrochemical plant situation.	process plant. (P4,PLO4) • CLO3: relate the relationship between safety interlock system, process controller and plant equipments using on the process plant. (A4,PLO10)
5	**DGI50153 POWER ELECTRONIC**	3	NONE	**POWER ELECTRONICS** course is aimed to equip students with the knowledge and skills related to power electronic devices and its application in power conversion. This course will focus on the operational principle of rectifiers, choppers, inverters and ac voltage controller's circuits. Students also will be familiarized with the output voltage waveforms of the power electronics converters.	• CLO1: determine the principle operations of various type of power electronics converters (C4,PLO2) • CLO2: perform the practical work on the power electronics converters using appropriate equipment (P4,PLO5) • CLO3: demonstrate an understanding of professional ethics, responsibilities and norms of engineering practices

					(A3,PLO8)
4 @ 5	**DGI40122 EMBEDDED ROBOTIC**	2	NONE	**EMBEDDED ROBOTIC** course presents the combination of mobile robots and embedded systems, from introductory to intermediate level. It is structured in three parts, dealing with embedded systems, sensors and actuators, and mobile robot design. These parts are essential to students in mastering the crucial steps of building a complete working robotic system. It will help them to develop robots that not only can move, but intelligent as well.	• CLO1: apply the concept of robot positioning, identification and communication in mobile robot control according to a standard robot organization regulation. (C3, PLO3) • CLO2: manipulate the application of sensor and actuator, robot identification and communication during practical work based on land mobile robot design. (P4, PLO4) • CLO3: organize mini competition among themselves to compete using land mobile robot. (A3, PLO8)

4 @ 5	**DGI40132 C PROGRAMMING**	2	NONE	**C PROGRAMMING** course provides an introduction to programme design and development. Student 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 and function structure.	• CLO1: apply the concepts of C programming to solve given problem using an appropriate data type (C3, PLO3) • CLO2: constructs a high level programming language in solving variety engineering and scientific problems (P4, PLO4) • CLO3: display behavior consistent with a positive ethic to complete assigned project based on C programming (A3, PLO8)

DIPLOMA KEJURUTERAAN MEKANIKAL (PETROKIMIA) (DPC)





DIPLOMA KEJURUTERAAN MEKANIKAL (PETROKIMIA)

INTRODUCTIONS

For the past few decades, industries have evolved and progressed rapidly. The Ninth Malaysia Plan was drawn in response to the current global needs and to enable Malaysia to stay competitive in the world market. Thus, to keep abreast with rapid technological advancements and evolving requirements in industries today, Department of Polytechnic Education (DPE) constantly collaborates with major industry players in the country in developing the respective curriculum. One of the most important factors towards the growth of productivity is by having a qualified and talented manpower in order for the industry to develop and remain competitive in the world market. This is equally true in industries where there is a rapidly growing demand for highly competent and technically savvy workforce. The activities of many industries require increasingly competent technician in engineering field, particularly in petrochemical fields.

In response to these issues, Curriculum Development and Evaluation Division of the Department of Polytechnic Education has developed and introduced Diploma in Mechanical Engineering (Petrochemical) for polytechnic. This programme aims to prepare students with knowledge, skills and abilities necessary in the petrochemical industries. To ensure the curriculum content fulfils the industrial requirements, several key players from related industries have been involved in the curriculum development process. Diploma in Mechanical Engineering (Petrochemical) for polytechnic is developed to give balanced emphasis on theoretical and practical aspects. The programme will take six semesters to complete, with a semester of industrial training at relevant industries.

SYNOPSIS

Diploma in Mechanical Engineering (Petrochemical) is designed to provide the students with the knowledge and technical skills prior to working as a plant technician in the petroleum and petrochemical industries, which covers the areas of plant operating, equipment servicing, troubleshooting and problem solving. The approach includes theoretical knowledge as well as hands-on experience in workshops, mini training plant, process plant simulation and laboratories.

JOB PROSPECT

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

a. Petrochemical Plant Maintenance Technician
b. Maintenance Supervisor (Oil & Gas)
c. Servicing Technician
d. General Mechanical Technician
e. Assistant Engineer
f. Sales Engineer

PROGRAMME AIMS

The Diploma in Mechanical Engineering (Petrochemical) graduates in Polytechnics, Ministry of Education will have the knowledge, technical skills, soft skills and attitude to adapt themselves with new technological advancement and challenges in the process engineering (petrochemical) field.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The Diploma in Mechanical Engineering (Petrochemical) programme shall produce semi-professionals who are:

PEO1: equipped with industry-relevant knowledge and skills in process engineering field

PEO2: engaging on lifelong and continuous learning to enhance knowledge and skills

PEO3: instilled with entrepreneurial skills and mind set in the real working environment

PEO4: established strong linkage 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 specialization as specified in DK1 to DK4 respectively to wide practical procedures and practices.

PLO2: Identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity (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, cultural, societal, and environmental considerations (DK5).

PLO4: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements.

PLO5: Apply appropriate techniques, resources, and modern engineering and IT tools to well-defined engineering problems, with an awareness of the limitations (DK6).

PLO6: Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technician practice and solutions to well-defined engineering problems (DK7).

PLO7: Understand and evaluate the sustainability and impact of engineering technician work in the solution of well-defined engineering problems in societal and environmental contexts (DK7).

PLO8: Understand and commit to professional ethics and responsibilities and norms of technician practice.

PLO9: Function effectively as an individual, and as a member in diverse technical teams.

PLO10: Communicate effectively 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.

PLO11: Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member or leader in a

technical team and to manage projects in multidisciplinary environments.

PLO12: Recognise the need for, and have the ability to engage in independent updating in the context of specialised technical knowledge.

PROGRAMME STRUCTURE (SEM 1- SEM 6)

COMPONENTS	COURSE CODE	COURSE	CONTACT HOURS			CREDIT
			L	P	T	
SEMESTER 1						
Compulsory	DUE 10012	Communicative English 1, 2 & 3	1	0	2	2
	MPU 24001	Sukan (U4)	0	2	0	1
	MPU 24001	Unit Beruniform 1*** (U4)	0	2	0	1
Common Core	DBM 10013	Engineering Mathematics 1,2 & 3	2	0	2	3
	DBS 10012	Engineering Science	2	1	0	2
Discipline Core	DGM 10012	Workshop Technology	2	0	0	2
	DGP 10013	Electrical Technology	2	2	0	3
	DGM 10022	Engineering Drawing	1	3	0	2
Specialization	DGM 10032	OSH In Petrochemical Engineering	2	0	0	2
		TOTAL	**24**			**17**
SEMESTER 2						
Compulsory	MPU 23052	Sains, Teknologi dan Kejuruteraan Islam	1	0	2	2
	MPU 23042	Nilai Masyarakat Malaysia	1	0	2	2
	MPU 23122	Komunikasi dan Penyiaran Islam	1	0	2	2
	MPU 24001	Kelab/Persatuan (U4)	0	2	0	1
	MPU 21001	Unit Beruniform 2*** (U4)	0	2	0	1
Common	DBM 20023	Engineering Mathematics 1,2 & 3	2	0	2	3
Discipline Core	DGM 20042	Mechanical Workshop Practice 1,2	0	4	0	2
	DJJ 20063	Thermodynamics	2	2	0	3
	DJJ 20073	Fluid mechanics	2	2	0	3
Specialization	DGM 20053	Petrochemical Technology	2	2	0	3
		TOTAL	**25**			**17**
SEMESTER 3						
Compulsory	DUE 30012	Communicative English 1, 2 & 3	1	0	2	2
Common	DBM 30033	Engineering Mathematics 1,2 & 3	2	0	2	3
Discipline Core	DGM 30062	Mechanical Workshop Practice 1,2	0	4	0	2
	DJJ 30113	Material Science and Engineering	2	2	0	3
	DJJ 30093	Engineering Mechanics	2	2	0	3
Specialization	DGM 30073	Piping And Instrumentation Diagram	2	2	0	3
		TOTAL	**23**			**16**

COMPONENTS	COURSE CODE	COURSE	CONTACT HOURS			CREDIT
			L	P	T	
SEMESTER 4						
Common	DJJ 40132	Engineering and Society	2	0	0	2
Discipline Core	DJJ 30103	Strength of Materials	2	2	0	3
	DGM 40083	Heat Transfer	2	2	0	3
Specialization	DGM 40092	Project 1, 2	1	2	0	2
	DGC 50093	Prosess Instrumentation and Control	2	2	0	3
	DGM 40102	Plant Maintenance	1	2	0	2
Elective	DJJ 42022	Industrial Management	2	0	0	2
	DGM 40112	Sustainable Engineering Design	2	0	0	2
	DGP 42022	Petroleum Technology	2	0	0	2
	DJF 51082	Quality Control	2	0	0	2
		TOTAL	**22**			**17**
SEMESTER 5						
Compulsory	MPU21032	Penghayatan Etika Dan Peradaban	1	0	2	2
	DUE 50032	Communicative English 1, 2 & 3	1	0	2	2
	MPU 22012	Entrepreneurship	2	1	0	2
Discipline Core	DJJ 40153	Pneumatics and Hydraulics	2	2	0	3
Specialization	DGM 50123	Project 1, 2	0	5	0	3
	DGM 50133	Static And Rotating Equipment	2	2	0	3
Elective	DJJ 40163	Mechanics of Machines	2	2	0	3
	DGM 50152	Computer Aided Design	0	4	0	2
	DGI 40102	Control System	2	2	0	3
	DGM 50142	Static And Rotating Equipment Workshop Practice	0	4	0	2
		TOTAL	**26**			**15**
SEMESTER 6						
	DUT 40110	INDUSTRIAL TRAINING				10
		TOTAL				**10**

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

SEMESTER	COURSE	CREDIT	PRE REQUISITE	SYNOPSIS	CLO
1	DUE10012 COMMUNICATION ENGLISH 1	2	NONE	**COMMUNICATIVE ENGLISH 1** focuses on developing students' speaking skills to enable them to communicate effectively and confidently in group discussions and in a variety of social interactions. It is designed to provide students with appropriate reading skills to comprehend a variety of texts. The students are equipped with effective presentation skills as a preparation for academic and purposes.	• CLO1 : Participate in a discussion using effective communication and social skills to reach an amicable conclusion by accommodating differing views and opinions.(A3) • CLO2: Demonstrate awareness of values and opinions embedded in texts on current issues. (A3) • CLO3: Present a topic of interest that carries identifiable values coherently using effective verbal and non-verbal communication skills. (A2)

1	**DBM 10013 ENGINEERING MATHEMATICS 1**	3	**NONE**	**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.	• CLO1: Use mathematical statement to describe relationship between various physical phenomena. (C3,CLS 1) • CLO2 : Analyze the types of the removal and joining process in mechanical engineering. (C4, PLO2) • CLO 3: demonstrate continuous learning and information management skills while engaging in the new knowledge and skills to write a report and presentation. (A3, PLO11)
1	**DBS 10012 ENGINEERING SCINECE**	2	NONE	**ENGINEERING SCIENCE** course introduces the physical concepts required in engineering disciplines. Students will learn the knowledge of fundamental physics in order to identify	• CLO1 : Use basic physics concept to solve engineering physics problems (C3, CLS 1) • CLO2 : Apply knowledge of fundamental physics in activities to mastery physics concept (C3, CLS 1)

				and solve engineering physics problems. Students will be able to perform experiments and activities to mastery physics concepts	• CLO3: Perform appropriate activities related to physics concept (P3, CLS 3a)
1	**DGP 10013 ELECTRICAL TECHNOLOGY**	3	NONE	**ELECTRICAL TECHNOLOGY** exposes students to basic electrical circuit concepts, the application of electromagnetism in electrical machines and transformers. The course focuses on the different types of electrical circuits, the relationship between current and voltage including the resistance. It also provides the skills on the measuring the electrical quantities and constructing basic circuits and operation of electrical machines and transformers.	• CLO1: Apply the basic Principles and the fundamentals of Electrical Technology to solved the electrical circuit problems. (C3, PLO1) • CLO2: Differentiate the function's of multimeter for measuring the electrical quantities inseries and parallel circuit. (P1,PLO4) • CLO3 : Practice the theory of Electrical Principles to performs practical task. (A2,PLO7)

1	**DGM10012 WORKSHOP TECHNOLOGY**	2	NONE	**WORKSHOP TECHNOLOGY** provides exposure and knowledge in using hand tools, machine operation such as drilling, lathe, and milling. 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).	• CLO1 : Apply the knowledge of basic mechanical components and equipment, hand tools and measuring equipment in workshop technology (C3, PLO1) • CLO2 : Analyze the types of the removal and joining process in mechanical engineering. (C4, PLO2) • CLO3 : demonstrate continuous learning and information management skills while engaging in the new knowledge and skills to write a report and presentation. (A3, PLO11)

1	**DGM 10022 ENGINEERING DRAWING**	2	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 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.	• CLO1 : Apply the basic fundamentals of engineering drawing in comply to related problems. (C3, PLO 1) • CLO2 : Construct engineering drawings according to the required standards and using fundamental features of CAD software. (P4, PLO 4) • CLO3 : Demonstrate the understanding of engineering norms and practices in engineering drawing. (A3, PLO 8)

1	**DGM 10032 OSH IN PETROCHEMICAL ENGINEERING**	2	NONE	**OSH IN PETROCHEMICAL ENGINEERING** course is designed to impart understanding of the self-regulatory concepts and provisions under the Occupational Safety & Health Act (OSHA). This course presents the responsibilities of employers and employees in implementing and complying with the safety procedures at work. This course provide an understanding of the key issues in OSH management, incident prevention, Emergency Preparedness and Response (EPR), fire safety, occupational first aid, Hazard Identification, Risk Assessment and Risk Control (HIRARC), plant safety and guide the students gradually into this multi-disciplinary science.	• CLO1: Identify the OSH legislation and its compliance in Malaysia. (C1, PLO1). • CLO2: Explain briefly incident hazards, risks and safe work practices in order to maintain health and safe work environment. (C2, PLO1). • CLO3 : Adhere to the safety procedures in respective fields. (A3, PLO8).

2	**DGM 20042 MECHANICAL WORKSHOP PRACTICE 1**	2	NONE	**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.	• CLO1 : Perform fitting, machining and welding works according to Standard Operating Procedure (SOP). (P4, PLO4) • CLO2 : Demonstrate the awareness of social responsibility and safety in practical work procedures and practices. (A3, PLO5) • CLO3 : Demonstrate an understanding of professional ethics, responsibilities and norms of engineering practices according to the workshop safety regulation. (A3, PLO8)

2	**MPU23052 SAINS TEKNOLOGI & KEJURUTERAAN DALAM ISLAM**	2	NONE	**SAINS,TEKNOLOGI DAN KEJURUTERAAN DALAM** 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.	• CLO1 : Melaksanakan dengan yakin amalan Islam dalam kehidupan seharian. (A2) • CLO2: Menerangkan etika dan profesionalisme berkaitan sains teknologi dan kejuruteraan dalam Islam (A3) • CLO3 : Menghubungkaitkan minda ingin tahu dengan prinsip syariah dan kaedah fiqh dalam sains, teknologi dan kejuruteraan menurut perspektif Islam. (A4)
2	**MPU23042 NILAI MASYARAKAT MALAYSIA**	2	NONE	**NILAI MASYARAKAT MALAYSIA** membincangkan aspek sejarah pembentukan masyarakat Malaysia, nilai-nilai agama serta adat resam dan budaya masyarakat di Malaysia. Selain itu, pelajar dapat memepelajari tanggungjawab sebagai individu dan nilai perpaduan dalam	• CLO1 : Membincangkan sejarah dan nilai dalam pembentukan masyarakat di Malaysia. (A2) • CLO2 : Menerangkan etika dan profesionalisme terhadap konsep perpaduan bagi meningkatkan semangat patriotisme

				kehidupan di samping cabaran-cabaran dalam membentuk masyarakat Malaysia.	masyarakat Malaysia. (A3) • CLO3 : Menghubungkait minda ingin tahu dengan cabaran-cabaran dalam membentuk masyarakat Malaysia. (A4)
2	**DBM 20023 ENGINEERING MATHEMATICS 2**	3	DBM10013	**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 relates maximum, minimum and calculate the rates of changes. This course discusses integration concepts in order to strengthen student's knowledge for solving area and volume bounded region problems. In addition, students will learn application of both techniques of differentiation and integration.	• CLO1 : Use algebra and calculus knowledge to describe relationship between various physical phenomena. (C3, CLS 1) • CLO2 : Solve the mathematical problems by using appropriate and relevant fundamental calculus techniques. (C3,CLS 3c) • CLO3 : Use mathematical language to express mathematical ideas and arguments precisely, concisely and logically in calculus. (A3,CLS 3b)

2	**DGM 20042 MECHANICAL WORKSHOP PRACTICE 1**	2	NONE	**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.	• CLO1 : Perform fitting, machining and welding works according to Standard Operating Procedure (SOP). (P4, PLO4) • CLO2: Demonstrate the awareness of social responsibility and safety in practical work procedures and practices. (A3, PLO5) • CLO3 : Demonstrate an understanding of professional ethics, responsibilities and norms of engineering practices according to the workshop safety regulation. (A3, PLO8)

2	**DGM 20053 PETROCHEMICAL TECHNOLOGY**	3	NONE	**PETROCHEMICAL TECHNOLOGY** provides exposure to the basic processes involved in oil and gas processing plant and also petrochemical plant. This 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.	• CLO1: Explain the properties of petroleum and basic operations of petroleum productions (C2, PLO1) • CLO2: Classify the common process flow diagram of gas processing plant, refinery and petrochemical plant (C3,PLO2) • CLO3: Perform Main functions and process flow of every plants involved in petroleum production (A2, PLO5)
2	**DJJ 20063 THERMODYNAMICS**	3	NONE	**THERMODYNAMICS** gives exposure in fundamental of engineering such as in unit and dimension. This course emphasizes basic thermodynamics concepts such as non flow process, flow process, first law of thermodynamics, second law of thermodynamics, steam power cycles	• CLO1 : Apply knowledge of mathematics, science and engineering fundamentals to well defined theory of thermodynamics. (C3, PLO1) • CLO2: Perform experiments related to thermodynamics field (P4, PLO4).

				and chemical equilibrium. Students will be exposed with plant process. Student will also provide knowledge and understanding of theory, concept and application of principles to solve problems related to processes in thermodynamics.	• CLO3: Discuss the application concept of thermodynamics in the plant process. (A2, PLO5)
2	**DJJ 20073 FLUID MECHANICS**	3	NONE	**FLUID MECHANICS** introduce and provide knowledge of the basic principles and concept of fluids mechanics with the application to practical engineering situations. This course will enable the students to learn about fluid properties, fluid static and fluid dynamics. This course also exposes the students to solve fluid mechanics problems in flow system, pipe system and dimensional analysis.	• CLO1 : apply knowledge of the basic principle and concepts related to fluid mechanics in process engineering (C3, PLO1). • CLO2: perform experiments related to fluid mechanics according to standard operating procedures (P4, PLO4). • CLO3 : demonstrate team work skill in assigned task (A3, PLO7).

3	**DUE30022 COMMUNICATION ENGLISH 2**	2	DUE10012	**COMMUNICATIVE ENGLISH 2** emphasises the skills required at the workplace to describe products or services as well as processes or procedures. This course will also enable students to make and reply to enquiries and complaints.	• CLO1 : Describe a product or sevice effectively by highlighting its features and characteristics that appeal to specific audience. (A3) • CLO2 : Describe prosseses, procedures and instructions clearly by highlighting information of concern. (A3) • CLO3: Demonstrate effective communication and social skills in handling enquiries and complaints amicably and professionally. (A2)
3	**DGM 230062 MECHANICAL WORKSHOP PRACTICE 2**	2	DGM 20042	**MECHANICAL WORKSHOP PRACTICE 2** exposes the students to Tungsten Inert Gas (TIG) welding and Metal Inert Gas (MIG) welding machine and machining process using lathe and milling machine. Safety procedure practice is	• CLO1: Perform welding, milling and lathe machining according to Standard Operating Procedure (SOP). (P4, PLO4) • CLO2 : Demonstrate the ability to work in team

				heavily emphasized in the workshop.	to complete assigned tasks during practical work sessions. (A3, PLO7) • CLO3 : Demonstrate an understanding of professional ethics, responsibilities and norms of engineering practices according to the workshop safety regulation. (A3, PLO8)
3	**DBM 30033 ENGINEERING MATHEMATICS 3**	3	DBM20023	**ENGINEERING MATHEMATICS 3** exposes students to the statistical and probability concepts and their applications in interpreting data. The course also introduces 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 and Newton-Raphson methods. In order to strengthen the students in solving engineering problems, Ordinary	• CLO1 : Demonstrate an understanding of the common body of knowledge in mathematics. (C3,CLS 1) • CLO2 : Demonstrate problems solving skills in engineering problems. (C3,CLS 3c) • CLO3: Use mathematical expression in describing real engineering problems precisely, concisely and logically. (A3,CLS 3b)

				Differential Equation (ODE) is also included. In additional, the course also discusses optimization problems by using Linear Programming. It is designed to build students' teamwork and problems solving skill.	
3	**DJJ 30113 MATERIAL SCIENCE AND ENGINEERING**	3	NONE	**MATERIALS SCIENCE** provides students with an understanding of material science and engineering which emphasizes on atomic and crystal structure, material properties and behaviour including material classification and application. Students also apply basic principles of material testing and processing through practical.	• CLO1: Relate the fundamental of materials science knowledge in engineering field. (C3, PLO1) • CLO2 : Perform experiments related to materials science and engineering. (P4, PLO4) • CLO3 : Demonstrate ability to work in team to complete assigned tasks. (A3, PLO7)

3	**DJJ 30093 ENGINEERING MECHANICS**	3	NONE	**ENGINEERING MECHANICS** focuses on theoretical knowledge in statics and dynamics. This course provides students with fundamental understanding of forces and equilibrium, resultants, equilibrium of a particles and structural analysis. This course also covers kinematics and kinetics of particles. This course also exposes students to the demonstration of experiments in Engineering Mechanics.	• CLO1: analyze problems related to statics and dynamics based on the concept and principles of engineering mechanics. (C4,PLO2) • CLO2 : organize appropriately experiments in groups according to the instruction given. (P4, PLO4) • CLO3: demonstrate ability to work in team to complete assigned tasks. (A3, PLO7)
3	**DGM 30073 PIPING AND INSTRUMENTATION DIAGRAM**	3	NONE	**PIPING AND INSTRUMENTATION DIAGRAM (P&ID)** provides knowledge on identify and sketch of common symbols used in process diagram. This course also provides knowledge and skill practice in interpreting the piping and	• CLO1 : Describe the symbol and process of flow diagram. (C2,PLO1) • CLO2 : Sketch the symbols and plant operation of piping and instrumentation diagram. (C3, PLO1)

				instrumentation diagram.	• CLO3: Read the plant operation of piping and instrumentation diagram. (A3, PLO6)
4	**DJJ 40132 ENGINEERING AND SOCIETY**	2	NONE	**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.	• CLO1 : Implement the roles of engineering profession towards the developing of society and its challenges in globalization (C3,PLO6) • CLO2: Determine the important of work ethics, bylaws and professionalism in engineering profession. (C4,PLO8) • CLO3: Determine the needs for sustainable and green engineering towards providing the solutions in engineering field. (C4,PLO7)

4	**DJJ 30103 STRENGTH OF MATERIALS**	3	NONE	**STRENGTH OF MATERIALS** provides knowledge on concepts and calculation of forces on materials, thermal stresses and composite bars, shear forces and bending moments, bending stresses, beam deflection and torsion in shafts. It also deals with the experiments conducted on tensile test, bending moment, shearing force, deflection and torsion.	• CLO1 : apply the fundamentals of strength of materials to solve related problems. (C3, PLO1) • CLO2 : perform experiments related to strength of materials. (P4, PLO4) • CLO3: demonstrate ability to work in team to complete assigned tasks. (A3, PLO7)
4	**DGM 40102 PLANT MAINTENANCE**	2	NONE	**PLANT MAINTENANCE** provides an understanding about the basic principles of the methods of maintaining process that will be conducted to facilities equipment in certain plants. Study component covers maintenance principles and procedures, lubrication, Water Treatment Plant, Cooling Water Plant	• CLO1 : Apply the fundamentals of plant maintenance knowledge in related industry. (C3, PLO1) • CLO2 : Perform the plant maintenance working flow, schedule and system correctly for the plant maintenance issues. (P4, PLO5)

				,Steam Generated Plant, Compressed Air Plant and Internal Combustion Engine as well as testing equipment.	• CLO3: Organize skill of individual and teamwork effectively on well-defined engineering activities based on related plant maintenance. (A3, PLO9)
4	**DGC 50093 PROCESS INSTRUMENTATION AND CONTROL**	3	NONE	**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 valve, transmitter, converter and controller. Students will understand the basic principle for control system and its usage according to petrochemical plant situation.	• CLO1 : Explain the fundamental of process control system, measurement and working principle of plant equipments used in the process plant. (C4, PLO1) • CLO2: Perform the measurement and basic process control system applied in process plant. (P4, PLO4) • CLO3: Relate the relationship between safety interlock system, process controller and plant equipments using on the process plant. (A4, PLO11)

4	**DGM40092 PROJECT 1**	2	NONE	**PROJECT** 1 introduces students with the ability and skills in planning and managing an innovative solutions 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.	• CLO1: Document an effective technical project proposal to solve well-defined problems in the related engineering field. (C4, PLO3) • CLO2: Organize an investigation of well-defined problems to provide an innovative and creative solutions for selected engineering research project. (P4, PLO4) • CLO3: Relate knowledge and developed skills to manage the project. (A4, PLO11)

4	**DGM 40083 HEAT TRANSFER**	3	NONE	**HEAT TRANSFER** emphasize 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.	• CLO1: Analyze the engineering principles and mechanism of heat transfer in different practical applications (C4, PLO3) • CLO2: Perform experiment related to different concept of heat transfer (P4, PLO5) • CLO3: Build teamwork with knowledge and experience to accomplish ongoing task. (A4, PLO9)
5	**DGM 50123 PROJECT 2**	2	DGM40092	**PROJECT 2** introduces the students to the concepts of conducting a design or case study. The students select a project, list the project's needs, the processes involved, cost estimation, project schedule by applying	• CLO1: Design creative solution to solve the problems in the project or case study (C5, PLO2) • CLO2: Construct the selected design or case study based on the project or case

				appropriate methodology in the project planning. It also involves project implementation, project report and presentation.	study planning and design. (P5, PLO4) • CLO3: Demonstrate awareness of management, business practices and entrepreneurship related to product of project. (A3, PLO9) • CLO4: Demonstrate awareness of social and environment responsibility in practical work procedure and practices. (A3, PLO10)
5	**MPU21032 PENGHAYATAN ETIKA DAN PERADABAN**	2	NONE	**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.	• CLO1 : Membentangkan konsep etika dan peradaban dalam kepelbagaian tamadun. (A2) • CLO2: Menerangkan sistem, tahap perkembangan, kesepaduan sosial dan kebudayaan merentas bangsa di Malaysia. (A2)

				Selain itu, perbincangan dan perbahasan berkaitan isu-isu kontemporari dalam aspek ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etiks fsn peradaban dapat melahirkan pelajar yang bermoral dan profesional. Penerapan amalan pendidikan berimpak tinggi (HIEPs) yang bersesuaian digunakan dalam penyampaian kursus ini.	• CLO3: Mencadangkan sikap yang positif terhadap isu dan cabaran kontemporari dari perspektif etika dan peradaban. (A3)
5	**DUE50032 COMMUNICATIVE ENGLISH 3**	2	DUE30022	**COMMUNICATIVE ENGLISH 3** aims to develop the necessary skills in students to analyse and interpret graphs and charts from data collected as well as job hunting mechanics. Students will learn the process of job hunting which includes job search strategies and making enquiries. They will also learn to write resumes and cover letters. The students will develop skills to introduce themselves, highlight	• CLO1: Describe and analyze information contained in graphs and charts clearly and accurately based on a mini project. (A3) • CLO2: Write an effective resume and a supporting cover letter for a relevant job opening. (C3)

				their strengths and abilities, present ideas, express opinions and respond appropriately during job interviews.	• CLO3: Handle a job interview effectively and confidently. (C3)
5	**MPU22012 ENTREPRENEUSHIP**	2	NONE	**ENTREPRENEUSHIP** focuses on the fundamentala and concept of entrepreneushiip in order to inculcate the value and interest in students to choose entrepreneushiip as a career. This course can help students to initiate creative and innovative entrepreneurial ideas. It also emphasizes a preparation of business plan framework through business model canvas.	• CLO1 : Propose the value proposition of entrepreneurial idea using Business model Canvas. (A3) • CLO2: Develop a viable business plan by organizing business objectives according to priorities. (A4) • CLO3: Organise the online presence business in social media marketing platform. (A3)
5	**DJJ 40153 PNEUMATIC AND HYDRAULICS**	3	NONE	**PNEUMATICS AND HYDRAULICS** provides knowledge and understanding to the importance of pneumatics and hydraulics circuits, equipment and design along with its usage in the industry.	• CLO1 : analyze the basic concept and function of pneumatics and hydraulics system. (C4,PLO2) • CLO2: construct pneumatic, electro-pneumatic and hydraulic circuit

					according to assigned tasks. (C5, PLO3 & P4, PLO4) • CLO3: demonstrate understanding of engineering norm and practices in pneumatics and hydraulics during • CLO4: practical work sessions. (A3, PLO8)
5	**DGM 50123 PROJECT 2**			**PROJECT 2** introduces the students to the concepts of conducting a design or case study. The students select a project, list the project's needs, the processes involved, cost estimation, project schedule by applying appropriate methodology in the project planning. It also involves project implementation, project report and presentation.	• CLO1: Design creative solution to solve the problems in the project or case study (C5, PLO2) • CLO2: Construct the selected design or case study based on the project or case study planning and design. (P5, PLO4) • CLO3: Demonstrate awareness of management, business practices and entrepreneurship

					related to product of project. A3, PLO9) • CLO4: Demonstrate awareness of social and environment responsibility in practical work procedure and practices. (A3, PLO10)
5	**DGM 50133 STATIC AND ROTATING EQUIPMENT**	3	NONE	**STATIC AND ROTATING EQUIPMENT** exposes students to seeking an in-depth understanding of static and rotating equipment which frequently used in Petrochemical Plant. This course provides basic knowledge of valve, piping, furnace, boiler, heat exchanger, pump, compressor, turbine, turbo expander and internal combustion engine. It also provides knowledge on the classifications, types and specific functions of their components systems.	• CLO1: Recognize static & rotating equipment commonly used in petrochemical plant. (C1, PLO1) • CLO2: Explain static & rotating equipment according to its classification, types and application. (C2,PLO1) • CLO3: Demonstrate course knowledge into an effective course assignment and present technical finding (A3, PLO3)

ELECTIVE	**DGM 50142 STATIC AND ROTATING EQUIPMENT WORKSHOP**	2	NONE	**STATIC AND ROTATING EQUIPMENT WORKSHOP** is a practice and exposure the students to dismantle and reassemble the static equipment which using in oil and gas processing plant and also petrochemical plant. This course also exposes the students to inspect and making maintenance for static equipment which used in petrochemical plant.	• CLO1: Practise safety measures at the workshop according to standard operating procedure. (P1, PLO4) • CLO2: Apply proper procedures in operating and maintaining static equipment according to standard operating procedure. (P4, PLO4) • CLO3: Identify various types of static equipment in terms of component and operating principles. (A2, PLO8)

ELECTIVE	**DJJ 40163 MECHANICS OF MACHINES**	3	DGM3053	**MECHANICS OF MACHINES** exposes the students with knowledge on techniques and concepts of mechanics of machines and analyzing problems related to hoists, friction, simple harmonic motion, velocity and acceleration diagram, friction and belt drives. This course also exposes the students to the demonstration of experiments in Mechanics of Machines by using the real equipment.	• CLO1 : Apply the fundamentals of mechanics of machines to solve related problems. (C3, PLO1) • CLO2: Perform experiments related to mechanics of machines. (P4, PLO4) • CLO3; Demonstrate ability to work in team to complete assigned tasks. (A3, PLO7)

ELECTIVE	**DGM50152 COMPUTER AIDED DESIGN**	2	DGM10022	**COMPUTER AIDED DESIGN (CAD)** exposes the students to the fundamental principles of 3D parametric part design and production-ready part drawings using 3D CAD software. Students will learn the various method of creating a solid model using extrude, revolve, swept, assembly, simulation and animation. Hands-on exercises representing real-world, industry-specific design of mechanical engineering will also be covered in this course.	• CLO1: Apply the function of CAD commands in producing engineering drawing and analysis simulation. (C3, PLO3) • CLO2: Construct drawing and analysis simulation of mechanical component in 3D according to drawing standard. (P4, PLO5) • CLO3: Demonstrate good presentation while engaging in engineering drawing knowledge, standard and skill to solve assigned task in group project (A3, PLO9)

ELECTIVE	**DGM40112 SUSTAINABLE ENGINEERING DESIGN**	3	NONE	**SUSTAINABLE ENGINEERING DESIGN** course offers a comprehensive coverage of process-design activities based on principle objectives of sustainability. Student will learn the fundamental concepts of sustainability and its application in designing process, designing consideration, ergonomic and materials selection, emphasizing on sustainability of simple components, materials or process system in engineering.	• CLO1: Derive the concept of sustainability as applied in abroad engineering disciplines. (C3,PLO3) • CLO2: Determine an engineering design process on a project design, taking into the design consideration ergonomic factors, life cycle-based, and material selection. (C4 ,PLO7) • CLO3: Develop roles in engineering design regarding to the environment and sustainability (A4,PLO12)

DIPLOMA KEJURUTERAAN KIMIA (DCE)

DIPLOMA KEJURUTERAAN KIMIA

INTRODUCTIONS

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 Chemical Engineering for polytechnic is developed to give balance emphasis on theoretical and practical aspects. The Eleventh Malaysia Plan was drawn to produce 60% out of 1.5 million workers in TVET sector. Until now a total of 69,475 (51%) of the 136,062 technical education and vocational training (TVET) graduates in Malaysia are working as professionals and skilled workers. 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 programme takes six semesters to complete, five academic semesters at the polytechnics and one semester of industrial training at relevant industries during the final semester. The programme will take six semesters to complete, with a semester of industrial training at relevant industries.

SYNOPSIS

The Diploma in Chemical Engineering programme is designed to produce holistic graduates that have knowledge and competent skills in the field of process engineering to fulfill 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, Mass and Energy Balance, Environment Quality and Pollution Control, Fluid Mechanics, Heat and Mass Transfer, Plant Utilities, Unit Operation,

Chemical Reaction Engineering, Process Instrumentation and Control and Transport Phenomena.

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 or Lecturer
h. Technical Sales Executive / Engineer
i. Draughter / Designer
j. Entrepreneur

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)

Diploma in Chemical Engineering programme shall produce balanced and competent TVET workers who are:

PEO1: equipped with industry-relevant knowledge and skills in process engineering field

PEO2: engaging on lifelong and continuous learning to enhance knowledge and skills

PEO3: instilled with entrepreneurial skills and mind set in the real working environment

PEO4: established strong linkage 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 specialization as specified in DK1 to DK4 respectively to wide practical procedures and practices.

PLO2: Identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity (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, cultural, societal, and environmental considerations (DK5).

PLO4: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements.

PLO5: Apply appropriate techniques, resources, and modern engineering and IT tools to well-defined engineering problems, with an awareness of the limitations (DK6).

PLO6: Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technician practice and solutions to well-defined engineering problems (DK7).

PLO7: Understand and evaluate the sustainability and impact of engineering technician work in the solution of well-defined engineering problems in societal and environmental contexts (DK7).

PLO8: Understand and commit to professional ethics and responsibilities and norms of technician practice.

PLO9: Function effectively as an individual, and as a member in diverse technical teams.

PLO10: Communicate effectively 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.

PLO11: Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member or leader in a

technical team and to manage projects in multidisciplinary environments.

PLO12: Recognise the need for, and have the ability to engage in independent updating in the context of specialised technical knowledge.

PROGRAMME STRUCTURE (SEM 1- SEM 6)

PROGRAMME STRUCTURE FOR DIPLOMA IN CHEMICAL ENGINEERING						
COMPONENTS	**COURSE CODE**		**CONTACT HOURS**			**CREDIT HOURS**
			L	**P**	**T**	
Semester 1						
Compulsary	DUE10012	COMMUNICATIVE ENGLISH 1	1	0	2	2
	MPU24XX1	SUKAN	0	2	0	1
	MPU24XX1	UNIT BERUNIFORM 1				
Common Core	DUW10022	OCCUPATIONAL, SAFETY AND HEALTH FOR ENGINEERING	2	0	0	2
	DBS10012	ENGINEERING SCIENCE	2	1	0	2
	DBM10013	ENGINEERING MATHEMATICS 1	2	0	2	3
Disipline Core	DGC10013	INORGANIC AND PHYSICAL CHEMISTRY	2	2	0	3
	DGP10013	ELECTRICAL TECHNOLOGY	2	2	0	3
		TOTAL	22			16
Semester 2						
Compulsary	MPU23052	SAINS, TEKNOLOGI DAN KEJURUTERAAN DALAM ISLAM*	1	0	2	2
	MPU23042	NILAI MASYARAKAT MALAYSIA**				
	MPU24XX1	KELAB/PERSATUAN	0	2	0	1
	MPU24XX1	UNIT BERUNIFORM 2				
Common Core	DBM20023	ENGINEERING MATHEMATICS 2	2	0	2	3
Disipline Core	DGC20023	ORGANIC CHEMISTRY	2	2	0	3
	DJJ20063	THERMODYNAMICS	2	2	0	3
	DJJ30113	MATERIAL SCIENCE AND ENGINEERING	2	2	0	3
	DGM10022	ENGINEERING DRAWING	1	3	0	2
		TOTAL	25			17
Semester 3						
Compulsary	DUE30022	COMMUNICATIVE ENGLISH 2	1	0	2	2
Common Core	DBM30033	ENGINEERING MATHEMATICS 3	2	0	2	3
Disipline Core	DGC30033	HEAT AND MASS TRANSFER	2	2	0	3
	DGC30043	MASS AND ENERGY BALANCE	3	0	1	3
	DJJ20073	FLUID MECHANICS	2	2	0	3
	DGP20062	PROCESS PLANT EQUIPMENT	1	2	0	2
		TOTAL	22			16

Semester 4						
Common Core	DJJ40132	ENGINEERING AND SOCIETY	2	0	0	2
Disipline Core	DGC40053	PLANT UTILITIES	2	2	0	3
	DGC40063	UNIT OPERATION	2	2	0	3
	DGC40073	CHEMICAL REACTION ENGINEERING	2	2	0	3
	DGC40083	ENVIRONMENTAL QUALITY AND POLLUTION CONTROL	2	2	0	3
	DGM40092	PROJECT 1	1	2	0	2
Elective		ELECTIVE***				
		TOTAL	21			16
Semester 5						
Compulsary	MPU21012	PENGAJIAN MALAYSIA	1	0	2	2
	DUE50032	COMMUNICATIVE ENGLISH 3	1	0	2	2
	MPU22012	ENTREPRENEURSHIP	1	0	2	2
Disipline Core	DGC50093	PROCESS INSTRUMENTATION AND CONTROL	2	2	0	3
	DGC50103	TRANSPORT PHENOMENA	3	0	0	3
	DGM50123	PROJECT 2	0	5	0	3
Elective		ELECTIVE***				
		TOTAL	21			15
Semester 6						
Industrial Training	DUT600610	ENGINEERING INDUSTRIAL TRAINING	0	0	0	10
		TOTAL				10
Elective Courses						
1	DGC42012	POLYMER ENGINEERING	2	0	0	2
2	DGC42022	OIL AND FAT PROCESSING TECHNOLOGY				
3	DGP52032	INDUSTRIAL MANAGEMENT				
4	DGP52042	WASTE WATER ENGINEERING				
5	DJJ52012	ENGINEERING PLANT TECHNOLOGY				
TOTAL CREDITS						**92**

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

SEMESTER	COURSE	CREDIT	PRE REQUISITE	SYNOPSIS	CLO
1	DUE10012 COMMUNICATION ENGLISH 1	2	NONE	**COMMUNICATIVE ENGLISH 1** focuses on developing students' speaking skills to enable them to communicate effectively and confidently in group discussions and in a variety of social interactions. It is designed to provide students with appropriate reading skills to comprehend a variety of texts. The students are equipped with effective presentation skills as a preparation for academic and purposes.	• CLO1: Participate in a discussion using effective communication and social skills to reach an amicable conclusion by accommodating differing views and opinions.(A3) • CLO2: Demonstrate awareness of values and opinions embedded in texts on current issues.(A3) • CLO3: Present a topic of interest that carries identifiable values coherently using effective verbal and non-verbal

					communication skills. (A2)
1	**DUW10022 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). This course presents the responsibilities of workers in implementing and complying with the safety procedures at work. Understanding of notifications of accidents, dangerous occurrence, poisoning and diseases and liability for offences will be imparted upon students. This course will also provide an understanding of the key issues in OSH Management, Incident Prevention, Fire Safety, Hazard Identification Risk Control and Risk Assessment (HIRARC), Workplace	• CLO1 : Explain briefly Occupational Safety and Health (OSH) procedures, regulation and its compliance in Malaysia (C2 , PLO 1) • CLO2 : Initiates incident hazards, risks and safe work practices in order to maintain health and safe work environment. (A3 , PLO 8) • CLO3 : Demonstrate communication skill in group to explain the factor that can lead to accident in workplace. (A3,PLO 10)

				Environment and Ergonomics and guide the students gradually into this multi-disciplinary science.	
1	**DBS 10012 ENGINEERING SCINECE**	2	NONE	**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.	• CLO1 : Use basic physics concept to solve engineering physics problems (C3, CLS 1) • CLO2 : Apply knowledge of fundamental physics in activities to mastery physics concept (C3, CLS 1) • CLO3 : Perform appropriate activities related to physics concept (P3, CLS 3a)
1	**DBM 10013 ENGINEERING MATHEMATICS 1**	3	NONE	**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	• CLO1 : Use mathematical statement to describe relationship between various physical phenomena. (C3,CLS 1)

				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.	• CLO2 : Show mathematical solutions using the appropriate techniques in mathematics. (C3,CLS 3c) • CLO3 : Use mathematical expression in describing real engineering problems precisely, concisely and logically. (A3,CLS 3b)
1	**DGC 10013 INORGANIC AND PHISICAL CHEMISTRY**	3	NONE	**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.	• CLO1 : Apply the basic concepts of physical chemistry of solving problems related to chemical analysis process in industry . (C3,PO1) • CLO2 : Perform laboratory experiments related to inorganic and physical chemistry. (P3,PO5)

					• CLO3 : Discuss engineering problems of societal, health, safety, legal and cultural issues in chemical industry. (A2,PO6)
1	**DGP10013 ELECTRICAL TECHNOLOGY**	3	NONE	**ELECTRICAL TECHNOLOGY** exposes students to concepts of basic electrical, electromagnetism and transformers. The course focuses on the different types of electrical circuits, the relationship between current and voltage including the resistance. It also provides the skills on the measuring the electrical quantities, constructing basic circuits and operation of transformer	• CLO1 : Apply the basic principles and fundamentals of Electrical Technology to solve electrical circuit problems (C3, PLO1) • CLO2 : Measure electrical quantities using multimeter in series, parallel and series parallel circuit (P4,PLO5) • CLO3 : Cooperate effectively to perform practical task (A2, PLO9)

2	**MPU23052 SAINS TEKNOLOGI & KEJURUTERAAN DALAM ISLAM**	2	TIADA	**SAINS,TEKNOLOGI DAN KEJURUTERAAN DALAM 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.	• CLO1: Melaksanakan dengan yakin amalan Islam dalam kehidupan seharian. (A2) • CLO2: Menerangkan etika dan profesionalism e berkaitan sains teknologi dan kejuruteraan dalam Islam (A3) • CLO3: Menghubungka itk an minda ingin tahu dengan prinsip syariah dan kaedah fiqh dalam sains, teknologi dan kejuruteraan menurut perspektif Islam. (A4)

2	**MPU23042 NILAI MASYARAKAT MALAYSIA**	2	TIADA	**NILAI MASYARAKAT MALAYSIA** membincangkan aspek sejarah pembentukan masyarakat Malaysia, nilai-nilai agama serta adat resam dan budaya masyarakat di Malaysia. Selain itu, pelajar dapat memepelajari tanggungjawab sebagai individu dan nilai perpaduan dalam kehidupan di samping cabaran-cabaran dalam membentuk masyarakat Malaysia.	• CLO1: Membincangkan sejarah dan nilai dalam pembentukan masyarakat di Malaysia.(A2) • CLO2: Menerangkan etika dan profesionalisme terhadap konsep perpaduan bagi meningkatkan semangat patriotisme masyarakat Malaysia. (A3) • CLO3: Menghubungkait minda ingin tahu dengan cabaran-cabaran dalam membentuk masyarakat Malaysia. (A4)

2	**DBM 20023 ENGINEERING MATHEMATICS 2**	3	DBM10013	**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 relates maximum, minimum and calculate the rates of changes. This course discusses integration concepts in order to strengthen student's knowledge for solving area and volume bounded region problems. In addition, students will learn application of both techniques of differentiation and integration.	• CLO1 : Use algebra and calculus knowledge to describe relationship between various physical phenomena. (C3,CLS 1) • CLO2 : Solve the mathematical problems by using appropriate and relevant fundamental calculus techniques. (C3,CLS 3c) • CLO3 : Use mathematical language to express mathematical ideas and arguments precisely, concisely and logically in calculus. (A3,CLS 3b)

2	**DGC20023 ORGANIC CHEMISTRY**	3	NONE	**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	• CLO1 : Apply the classification of organic compounds by functional groups, IUPAC nomenclature, the properties and the preparation and reactions of organic compounds. (C3,PLO1) • CLO2 : Perform practical skill in organic chemistry laboratory experiment. (P4,PLO5) • CLO3 : Display ability to work in a group with proper techniques to create a secured environment in practical works. (A3, PLO9)

2	**DJJ20063 THERMODYNAMICS**	3	NONE	**THERMODYNAMICS** provides knowledge of theory, concept and application of principles to solve problems related to thermodynamics. It emphasizes on concept of non-flow process and flow process, properties of steam, Carnot cycle and Rankine cycle. This course also exposes the students to the demonstration of experiments in Thermodynamics by using the real equipment.	• CLO1 : Explain fundamentals concept and properties of pure substances in thermodynamics (C2, PLO1) • CLO2 : Apply Laws of thermodynamics and it processes (C3, PLO1) • CLO3 : Organize appropriately experiments according to the Standard Operating Procedures (P4, PLO5)

2	**DJJ30113 MATERIAL SCIENCE AND ENGINEERING**	3	NONE	**MATERIALS SCIENCE AND ENGINEERING** course introduces students a comprehensive coverage of basic fundamentals of materials science and engineering. The course focuses on material structures, properties, fabrication methods, corrosion, thermal processing and material testing mostly of metals and alloys. New fabrication method of powder metallurgy are introduces to student to cater the fabrications of devices, sensors for Industry 4.0 technology.	• CLO1 : Apply the fundamental of material science to identify the materials, properties, behavior, processes and treatment. (C3 ,PLO1) • CLO2 : Performed appropriate material testing according to the Standard Operating Procedures. (P4 , PLO5) • CLO3 : Demonstrate the ability to work individually and in groups to complete assigned tasks during the practical work session. (A3 ,PLO9)

2	**DGM10022 ENGINEERING DRAWING**	2	NONE	**THE 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,	• CLO1 : Apply the basic fundamentals of engineering drawings and features of CAD software in producing engineering drawing. (C3, PLO1) • CLO2 : Construct the engineering drawings and 2D CAD drawings according to the engineering standards. (P4, PLO5) • CLO3 : Demonstrate the understanding of engineering norms and practices in engineering drawing standard. (A3, PLO10)

				drawing aids, layer, block, insert, dimensioning, hatching and plotting.	
3	**DUE30022 COMMUNICATION ENGLISH 2**	2	DUE10012	**COMMUNICATIVE ENGLISH 2** emphasises the skills required at the workplace to describe products or services as well as processes or procedures. This course will also enable students to make and reply to enquiries and complaints.	• CLO1: Describe a product or sevice effectively by highlighting its features and characteristics that appeal to specific audience. (A3) • CLO2: Describe prosseses, procedures and instructions clearly by highlighting information of concern. (A3) • CLO3: Demonstrate effective communicatio n and social skills in handling enquiries and complaints amicably and professionally. (A2)

3	**DBM 30033 ENGINEERING MATHEMATICS 3**	3	DBM20023	**ENGINEERING MATHEMATICS 3** exposes students to the statistical and probability concepts and their applications in interpreting data. The course also introduces 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 and Newton-Raphson methods. In order to strengthen the students in solving engineering problems, Ordinary Differential Equation (ODE) is also included. In additional, the course also discusses optimization problems by using	• CLO1 : Demonstrate an understanding of the common body of knowledge in mathematics. (C3,CLS 1) • CLO2 : Demonstrate problems solving skills in engineering problems. (C3,CLS 3c) • CLO3 : Use mathematical expression in describing real engineering problems precisely, concisely and logically. (A3,CLS 3b)

				Linear Programming. It is designed to build students' teamwork and problems solving skill.	
3	**DGC30043 MASS AND ENERGY BALANCE**	3	DGC10013	**MASS AND ENERGY BALANCES** is designed as an introduction to fundamentals of materials and energy balances. The emphasis is on understanding the principles of material and energy balances in chemical process systems. This course will develop the student's ability to formulate and solve material and energy balances problems for chemical process systems.	• CLO1: Discuss the basic principle engineering calculation involving material and energy balances in engineering process systems. (C2, PLO1) • CLO2: Solve material and energy balances problems for processes with or without chemical reaction in chemical process systems. (C3, PLO2)

					• CLO3: Practice the principles and techniques of solving problems involving material and energy balances in chemical process industry. (A2, PLO9)
3	**DJJ20073 FLUID MECHANICS**	3	NONE	**FLUID MECHANICS** provides students with a strong understanding of the fundamentals of fluid mechanics principles related to the fluid properties and behavior in static and dynamic situations. This course also exposes the students to the demonstration at the real equipment of fluid mechanics. .	• CLO1: Explain the fundamentals of fluid. (C2, PLO1) • CLO2: Solve problems related to fluid properties, fluid statics and fluid dynamics. (C3, PLO1) • CLO3: Organize appropriate experiments in groups according to the standard operating

					procedures. (P4, PLO5)
3	**DGP 20062 PROCESS PLANT EQUIPMENT**	2	NONE	**PROCESS PLANT EQUIPMENT** provides knowledge on concepts and basic principles of plant static and rotary equipment. The course emphasis on general uses and basic operating principles of static and rotary equipment such as valve, pipe, furnace, boiler, heat exchanger, pump, compressor, turbine and internal combustion engine. Students will be introduced to the classifications, types and specific functions of the stated components above.	• CLO1 : elaborate process plant equipment according to its classification, types, function and application. (C2, PLO1) • CLO2 : perform proper procedures in operating and maintaining process plant equipment according to standard operating procedure. (P4, PLO5) • CLO3 : describe specific process plant equipment according to their functions and operating principle in a process plant. (A3, PLO12)

4	**DJJ40132 ENGINEERING AND SOCIETY**	2	NONE	**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.	• CLO1: Implement the roles of engineering profession towards the developing of society and its challenges in globalization. (C3,PLO6) • CLO2: Determine the important of work ethics, bylaws and professionalism in engineering profession. (C4,PLO8) • CLO3: Determine the needs for sustainable and green engineering towards providing the solutions in engineering field. (C4,PLO7)

4	**DGC40053 PLANT UTILITIES**	3	NONE	**PLANT UTILITIES** introduces 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 function, calculations, the basic design, the main equipment involved, functions, mechanical characteristics and its operating procedures. During this course, the student will also be exposed into practical skills regarding utility plant operations and maintenance through practical works.	• CLO1: Apply the function, process flow and basic calculation involved in utility plant system. (C3,PLO1) • CLO2: Perform practical tasks relating to utility plant operation (P4, PLO5) • CLO3: Demonstrate societal awareness towards sustainable environment (A3, PLO7)
4	**DGC40063 UNIT OPERATION**	3	NONE	**UNIT OPERATION** provides knowledge regarding the equipment or process unit as well as its function use in the industry. The unit operations are	• CLO1: Apply the principles and methods of separation process in unit operation to solve related problem based

				largelyused 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	on its application and functions. (C3,PLO3) • CLO2: Perform experiments related to unit operation according to standard operating procedures .(P4,PLO5) • CLO3: Demonstrate ability to work in team to complete assigned tasks (A3,PLO9)

				make a selection of the most suitable unit to be used in a process depending on certain factors	
4	**DGC40073 CHEMICAL REACTION ENGINEERING**	3	NONE	**CHEMICAL REACTION ENGINEERING** gives exposure to basic principles of batch reactor, continuous stirred tank reactor (CSTR), plug flow reactor (PFR) and reactors in series. This course covers the fundamental of chemical kinetics principles and reactor design. It is including the conversion and sizing of chemical reactors such as CSTR, PFR and reactors in series. This course also on rate laws and stoichiometric table. The course will discuss the design structure for isothermal batch, plug flow, continuous stirred reactors and also pressure drop in	• CLO1: Apply the theories, principles and specific equations in the basic calculation of the reactors design in chemical reaction engineering. (C3,PLO3) • CLO2: Perform the principles of chemical reaction engineering by doing practical tasks on the isothermal and adiabatic reactor. (P4,PLO5)

				reactors. The catalysis and catalytic reactors chapter will develop an understanding of catalysts, reaction mechanisms, and catalytic reactor design.	• CLO3: Practice the fundamentals of chemical reaction engineering principles. (A2,PLO8)
4	**DGC40083 ENVIRONMENTAL QUALITY AND POLLUTION CONTROL**	3	NONE	**ENVIRONMENTAL QUALITY & POLLUTION CONTROL** provides knowledge that equip students to have the clear view of environmental engineering knowledge which include the 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	• CLO1: Analyze the environmental engineering and management knowledge with the associated problems based on the current regulations and standard clearly. (C4 ,PLO4) • CLO2: Perform experiments related to environmental quality methods appropriately. (P4,PLO5) • CLO3: Demonstrate waste minimization and pollution issues critically

				course, the students will understand and contribute for the effective responsibility towards the sustainable development nation.	towards achieving sustainable environment responsibilities. (A3,PLO7)
4	**DGM40092 PROJECT 1**	2	NONE	**PROJECT 1** introduces students with the ability and skills in planning and managing an innovative solutions 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.	• CLO1: Document an effective technical project proposal to solve well-defined problems in the related engineering field. (C4,PO3) • CLO2: Organize an investigation of well-defined problems to provide an innovative and creative solutions for selected engineering research project. (P4,PO4) • CLO3: Relate knowledge and

					developed skills to manage the project. (A4, PO11)
5	**MPU21032 PENGHAYATAN ETIKA DAN PERADABAN**	2	NONE	**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 etiks fsn peradaban dapat melahirkan pelajar yang bermoral dan	• CLO1: Membentangkan konsep etika dan peradaban dalam kepelbagaian tamadun. (A2) • CLO2: Menerangkan sistem, tahap perkembangan, kesepaduan sosial dan kebudayaan merentas bangsa di Malaysia. (A2) • CLO3: Mencadangkan sikap yang positif terhadap isu dan cabaran kontemporari dari perspektif etika dan peradaban. (A3)

				profesional. Penerapan amalan pendidikan berimpak tinggi (HIEPs) yang bersesuaian digunakan dalam penyampaian kursus ini.	
5	**DUE50032 COMMUNICATIVE ENGLISH 3**	2	DUE30022	**COMMUNICATIVE ENGLISH 3** aims to develop the necessary skills in students to analyse and interpret graphs and charts from data collected as well as job hunting mechanics. Students will learn the process of job hunting which includes job search strategies and making enquiries. They will also learn to write resumes and cover letters. The students will develop skills to introduce themselves, highlight their strengths and	• CLO1: Describe and analyze information contained in graphs and charts clearly and accurately based on a mini project. (A3) • CLO2: Write an effective resume and a supporting cover letter for a relevant job opening. (C3) • CLO3: Handle a job interview effectively and confidently. (C3)

				abilities, present ideas, express opinions and respond appropriately during job interviews.	
5	**DGC50103 TRANSPORT PHENOMENA**	3	NONE	**TRANSPORT PHENOMENA** covers momentum transfer (also known as fluid dynamics). Student will be introduced to the governing equations for the motion of fluid flows: equation of continuity, equation of motion and energy equation. In the following section, dynamic similitudes and information required for designing pipeline systems are introduced.	• CLO1: Explain the engineering principles of momentum transport. (C2, PLO1) • CLO2: Figure out the solution for engineering problems involving momentum transport. (C4, PLO3) • CLO3: Propose solution to problems related to momentum transport. (A3, PLO12)

5	**MPU22012 ENTREPRENEUSHIP**	2	NONE	**ENTREPRENEUSHIP** focuses on the fundamental and concept of entrepreneuship in order to inculcate the value and interest in students to choose entrepreneuship as a career. This course can help students to initiate creative and innovative entrepreneurial ideas. It also emphasizes a preparation of business plan framework through business model canvas.	• CLO1: Propose the value proposition of entrepreneurial idea using Business model Canvas. (A3) • CLO2: Develop a viable business plan by organizing business objectives according to priorities. (A4) • CLO3: Organise the online presence business in social media marketing platform. (A3)

5	**DGC50093 PROCESS INSTRUMENTATION AND CONTROL**	3	NONE	**PROCESS INSTRUMENTATIO N 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 valve, transmitter, converter and controller. Students will understand the basic principle for control system and its usage according to petrochemical plant situation	• CLO1: Determine the fundamental of process control system, measurement and working principle of plant equipments used in the process plant. (C4,PLO2) • CLO2: Perform the measurement and basic process control system applied in process plant. (P4,PLO4) • CLO3: Relate the relations hip between safety interlock system, process controller and plant equipments used on the process plant. (A4,PLO10)

5	**DGM50123 PROJECT 2**	3	DGM40092	**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.	• CLO1: Organize design solution to solve specified engineering problems. (P3, PLO3) • CLO2: Organize problem solving methodologies to investigate and evaluate the selected innovative solutions. (P5, PLO4) • CLO3: Complete project development process using appropriate techniques, resources and modern engineering and IT tools. (P4, PLO5) • CLO4: Prepare an effective presentation that consists of project

					activities and outcomes. (A4, PLO10) • CLO5: Manage project activities and outcomes in producing technical report accordance to the standard format. (A5, PLO11)
ELECTIVE	**DGC42012 POLYMER ENGINEERING**	2	NONE	**POLYMER ENGINEERING** discusses on 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, polymer compounding process and the method of polymer processing.	• CLO1: Explain the general concepts of polymerization and its properties. (C2, PLO1) • CLO2: Break down polymer according to its types, materials and processes. (C4, PLO2) • CLO3: Demonstrate skills of

					communication effectively on well defined engineering activities in polymer industries process (A3, PL10)
ELECTIVE	**DGC42022 OIL AND FAT PROCESSING TECHNOLOGY**	2	NONE	**OIL AND FAT PROCESSING TECHNOLOGY** covers the study of several methods used in oil and fat processing. The raw materials for oil and fat products include animal fats, vegetable oils and seed oils. The crude fats and oils from these sources are recovered using a number of methods such as oil extraction, refining, modification and fat splitting. The extent of fat and oil process depends on the source, quality, and nature of the end use.	• CLO1: Explain concept and methods of oil and fat processing. (C2, PLO1) • CLO2: Determine the various processes processing. • CLO3: Write report on good and safe handling practices of oil and fat processing. (A2, PLO10)

ELECTIVE	**DGP52032 INDUSTRIAL MANAGEMENT**	2	NONE	**INDUSTRIAL MANAGEMENT** provides students with a strong fundamental understanding of industrial management prospect and production system planning such as inventory, scheduling, production system operation, facilities, plan location, layout and line balancing. This course also provides knowledge in quality control and human resource management.	• CLO 1: Apply the principles and elements of management concept, quality and human management in sector. (C3,PLO2) • CLO 2: Calculate the elements of plant location, layout and line balancing, Inventory control management and scheduling (C3,PLO8) • CLO 3: Describe the quality management practice in the industry. (A3,PLO10)

ELECTIVE	**DGP52042 WASTE WATER ENGINEERING**	2	NONE	**WASTEWATER ENGINEERING** focuses on characteristics of wastewater and treatment technologies that been used in industries. This course give exposure to the student on current environmental situation and the need to protect the environment for future generation. The topics cover on regulation and policies, characterization wastewater, theory and fundamental of wastewater treatment process and sustainability towards the environment.	• CLO1: Identify constituent of wastewater and analysis of wastewater flowrate and mass loading (C1,PLO2) • CLO2: Understand and elaborate the common physical, chemical and biological unit operations encountered in treatment processes. (C2,PLO8) • CLO3: Discuss the need of wastewater treatment to the ecosystem (A2,PLO10)

JABATAN MATEMATIK DAN SAINS KOMPUTER (JMSK)

JABATAN MATEMATIK DAN SAINS KOMPUTER (JMSK)

INTRODUCTIONS

Department of Mathematics and Computer Science (JMSK) is one of our main departments of Polytechnic Tun Syed Nasir Syed Ismail (PSTN). It was established to support the courses based on science and technology. It offers courses such as Engineering Mathematics and Engineering Science for students. The lecturers in this department consist of professionals who were trained in their respective fields.

LIST OF FACILITIES

- Training Computer Lab (20 units)
- General Computer Lab (40 units)
- Mathematics Lab (40 units)
- Engineering Science Lab (40 students)

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

SEMESTER	COURSE	CREDIT	PRE REQUISITE	SYNOPSIS	CLO
1	DBM1013 ENGINEERING MATHEMATICS 1	3	NONE	**ENGINEERING MATHEMATICS 1** expose students to the basic algebra including perform partial fractions. This course also exposes the concept of trigonometry and the method to solve trigonometry problems by using basic identities, compound angle and double angle formulae. Students also will be introduced to the theory of complex number and matrices method to solve simultaneous equation. This course also introduces students to concept of vector and scalar.	• Identify mathematical methods in solving the mathematical problems. • Solve the mathematical problems by using appropriate techniques and solutions. • Practice mathematical knowledge and skills in different mathematics problem.

1	**DBS1012 ENGINEERING SCIENCE**	2	NONE	**ENGINEERING SCIENCE** is an applied science with theoretical concepts and practical learning sessions that can be applied in the engineering fields. This course focuses on the Physical Quantities, Measurement, Linear Motion, Force, Work, Energy, Power, Solid, Fluid, Temperature and Heat.	• solve the basic engineering science problems by using related concept. • organise an appropriate experiment to prove related physic principles. • apply related physic principles in various situations to enhance knowledge.

2	**DBM2013 ENGINEERING MATHEMATICS 2**	3	NONE	**ENGINEERING MATHEMATICS 2** exposes students to the basic laws of exponents and logarithms. This course also introduces the basic rules of differentiation concept to solve problems that relate maximum, minimum and calculate the rates of changes. This course also discuss integration concept in order to strengthen student knowledge for solving area and volume bounded region problems. In addition, students also will learn application of both techniques of differentiation and integration.	• solve the mathematical problems by using appropriate mathematical techniques and solutions. • show the solution for differentiation and integration problem by using appropriate method. • practice mathematical knowledge and skills in different mathematics problem.

3	**DBM3013 ENGINEERING MATHEMATICS 3**	3	NONE	**ENGINEERING MATHEMATICS 3** exposes students to the statistical and probability concepts and their applications in interpreting data. The course also introduces 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 and Newton-Raphson methods. In additional, the course also discusses optimization problems by using Linear Programming. In order to strengthen the students in solving advanced engineering problems, Ordinary Differential Equation (ODE) is also included.	• solve the mathematical problems by using appropriate techniques and solutions. • show the solution for statistics and probability problems, and linear programming by using appropriate mathematical methods. • practice mathematical knowledge and skills in different mathematical problem.

JABATAN PENGAJIAN AM (JPA)

JABATAN PENGAJIAN AM (JPA)

MAKLUMAT AM

Jabatan Pengajian Am (JPA) adalah merupakan jabatan akademik sokongan yang bertanggungjawab menyokong jabatan akademik induk dalam proses pengajaran dan pembelajaran, di samping mendokong aspirasi dan sasaran Jabatan Pengajian Politeknik bagi melahirkan graduan yang berkualiti. Ianya mempunyai misi bagi menyediakan pendidikan secara formal dan tidak formal dengan menawarkan kursus- kursus yang membantu pelajar dalam menaikkan mutu diri dan sahsiah serta membentuk peribadi bernilai tinggi. Jabatan ini terbahagi kepada dua unit iaitu Unit Pendidikan Islam dan Moral serta Unit Bahasa Inggeris yang menawarkan kursus Pengajian Malaysia, Nilai Masyarakat Malaysia, Sains Teknologi & Kejuruteraan Dalam Islam, Communicative English 1, Communicative English 2, Communicative English 3, Komunikasi & Penyiaran Islam dan Entrepreneurship.

Jabatan Pengajian Am mempunyai misi penting untuk membantu melahirkan graduan serta tenaga kerja separa profesional yang berkeperibadian mulia dengan menerapkan nilai-nilai Islam, di samping membentuk sahsiah pelajar kearah menjadi insan yang berkualiti, profesional dan mempunyai nilai tambah, terutamanya bagi menyiapkan mereka bagi mengharungi zaman pekerjaan mereka nanti.

LIST OF FACILITIES

1) Digital Multimedia Language Lab 1
2) Digital Multimedia Language Lab 2
3) Digital Multimedia Language Lab 3
4) Mini Teater Ibn Bajjah
5) Mini Teater al-Zarqali
6) Bilik Tasmik 1
7) Bilik Tasmik 2
8) Bilik Tasmik 3

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

SEMESTER	COURSE	CREDIT	PRE REQUISITE	SYNOPSIS	CLO
1	DUB1012 PENGAJIAN MALAYSIA	2	TIADA	**PENGAJIAN MALAYSIA** memupuk penghayatan ke arah melahirkan generasi yang cintakan negara. Kursus ini juga dapat mendidik kelompok masyarakat yang mempunyai daya juang yang tinggi dan mampu menghadapi cabaran di peringkat antarabangsa. Kursus ini memberi penghayatan tentang sejarah dan politik, perlembagaan Malaysia, Kemasyarakatan dan perpaduan, pembangunan negara dan isu-isu keprihatinan negara. Objektif kursus ini adalah untuk	• Menerangkan dengan baik sejarah bangsa dan negara. • Menjelaskan Perlembagaan Malaysia dan sistem pemerintahan negara. • Melaksanakan aktiviti berkaitan kenegaraan ke arah peningkatan patriotisme pelajar.

				melahirkan warganegara yang setia dan cintakan negara, berwawasan serta bangga menjadi rakyat Malaysia.	
1	**DUE1012 COMMUNIATIVE ENGLISH 1**	2	TIADA	**COMMUNIATIVE ENGLISH 1** focuses on developing students' speaking skills to enable them to communicate effectively and confidently in group discussions and in a variety of social interactions. It is designed to provide students with appropriate reading skills to comprehend a variety of texts. It is also aimed to equip students with effective presentation skills.	• Apply appropriate language and communication skills in discussions and conversations. • Apply effective listening skills to demonstrate comprehension of audio recordings in a variety of situations. • Comprehend a variety of reading texts by applying effective reading skills. • Write in response to a stimulus using appropriate language. Deliver an effective presentation using appropriate visual aids and, verbal and non- verbal

					communication skills.
2	**DUA2012 SAINS TEKNOLGI & KEJURUTERAAN DALAM ISLAM**	2	TIADA	**SAINS,TEKNOLOGI DAN KEJURUTERAAN DALAM 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.	• Menghuraikan konsep Islam sebagai cara hidup • Menjelaskan konsep sains, teknologi dan kejuruteraan dalam Islam • Membincangkan prinsip syariah dan kaedah fiqah dalam sains, teknologi dan kejuruteraan

2	**DUB2012 NILAI MASYARAKAT MALAYSIA**	2	TIADA	**NILAI MASYARAKAT MALAYSIA** membincangkan aspek sejarah pembentukan masyarakat Malaysia, nilai-nilai agama serta adat resam dan budaya masyarakat majmuk. Selain itu, pelajar diberi kefahaman mengenai tanggungjawab individu dalam kehidupan dan cabaran-cabaran dalam membangunkan masyarakat Malaysia.	• Menerangkan sejarah pembentukan masyarakat dan nilai agama di Malaysia. • Menghubung kait tanggungjawab individu dalam kehidupan masyarakat dan negara. • Mengenal pasti cabaran-cabaran dalam membangunkan masyarakat • Malaysia.
3	**DUE3012 COOMUNICATIVE ENGLISH 2**	2	TIADA	**COMMUNICATIVE ENGLISH 2** emphasises the skills required at the workplace to describe products or services as well as processes or procedures. It also focuses on the skills to give and respond to instructions. This course will also enable students to make and reply to enquiries and complaints	• Describe products or services related to their field of studies using appropriate language. • Transfer information of a processes or procedures accurately from non- liner to liner form and vice versa.

					• Listen and respond to enquiries using appropriate language. • Make and respond to complaints using appropriate language.
4	**DUE5012 COOMUNICATIVE ENGLISH 3**	2	**DUE1012 COMMUNIATIVE ENGLISH 2**	**COMMUNICATIVE ENGLISH 3** aims to develop the necessary skills in students to analyse and intepret graphs and charts from data collected as well as job hunting mechanics. Students will learn to present data through the use of graphs and charts. Students will learn the process of job hunting which includes job search strategies and making enquiries. They will also learn to write resumes	• Describe and analyse information contained in graphs and charts clearly and accurately based on a mini project. • Write an effective resume and a supporting cover letter for a relevant job opening. • Handle a job interview effectively and confidently.

				and cover letters. The students will develop skills to introduce themselves, highlight their strengths and abilities, present ideas, express opinions and respond appropriately during job interviews.	
5	**DPB2012 ENTREPRENEURSHIP**	2	**TIADA**	**ENTREPRENEURSHIP** focuses the principles and concept of entrepreneurship. This course concentrates on the systematic methods of getting business ideas. This course also prepares students on conducting online business using social media marketing. It also emphasizes a preparation of business plan and developing their entrepreneurial skills.	• Explain clearly the concept of entrepreneurship and process of developing an effective business. • Prepare completely a business plan according to standard format. • Build the online business presence using the social media marketing.

5	**DUA6022 KOMUNIKASI DAN PENYIARAN ISLAM**	2	TIADA	**KOMUNIKASI DAN PENYIARAN ISLAM** memfokuskan kepada penguasaan konsep, kemahiran komunikasi dan penyiaran Islam bagi meningkatkan kefahaman pelajar secara holistik terhadap kursus ini.	• Menjelaskan konsep, bentuk komunikasi dan hubungannya dalam Islam. • Menunjukkan kemahiran pengurusan komunikasi dalam bidang penyiaran Islam. • Menghubungkait isu- isu semasa dalam komunikasi dan penyiaran Islam.

JABATAN SUKAN, KEBUDAYAAN DAN KESENIAN (JSSK)

JABATAN SUKAN, KESENIAN DAN KEBUDAYAAN (JSKK)

MAKLUMAT AM

Fungsi Jabatan Sukan, Kesenian dan Kebudayaan (JSKK) adalah menyelaras dan mengendalikan semua aktiviti akademik (kokurikulum) bagi semester 1 hingga semester 4 yang terdiri daripada badan beruniform (MPU24XX1), Sukan (MPU24011) dan Kelab (MPU24021) dan aktiviti bukan akademik (sukan & kebudayaan) untuk semua pelajar pada setiap semester. Aktiviti ini merupakan elemen penting dalam membentuk modal insan yang berketerampilan serta cergas dalam membentuk sahsiah diri semasa dan selepas tamat belajar.

SENARAI FASILITI

1. Padang Bola Sepak
2. Padang Balapan
3. Gelanggang Bola Jaring
4. Gelanggang Bola Tampar
5. Gelanggang Batminton
6. Gelanggang Futsal
7. Gelanggang Bola Keranjang
8. Gelanggang Tenis
9. Gelanggang Boling Padang

SYNOPSIS AND LEARNING OUTCOMES (CLO) (SEM 1- SEM 4)

SEMESTER	COURSE	CREDIT	PRE REQUISITE	COURSE	CLO
1	UNIT BERUNIFORM 1	1	TIADA	WATANIAH 1, PISPA 1	• Mempamerkan kemahiran khusus bagi kursus berkaitan • Menunjukkan kepimpinan dan kerja berpasukan berdasarkan penguasaan kemahiran dan amalan positif and non-verbal communication skills. (A2)
1	SUKAN	1	TIADA	• BADMINTON • PING PONG • TENNIS • BOLA TAMPAR • SOFTBAL • DART • MEMANAH • FUTSAL • CATUR • SEPAK TAKRAW • BOLA SEPAK • BOLING PADANG	• Mempamerkan kemahiran khusus bagi kursus berkaitan • Menunjukkan kepimpinan dan kerja berpasukan berdasarkan penguasaan kemahiran dan amalan positif

2	**KELAB**	1	TIADA	• KELAS SENI LANDSKAP • KEMBARA • INOVASI &REKA CIPTA • KEUSAHAWANAN • AMALAN 5S • LAYANG-LAYANG • KAUNSELING • MESRA ALAM • KOMPUTER • NASYID • KOMPANG • PENGGUNA • AUDIO VISUAL • TEATER	• Mempamerkan kemahiran khusus bagi kursus berkaitan • Menunjukkan kepimpinan dan kerja berpasukan berdasarkan penguasaan kemahiran dan amalan positif
2	**UNIT BERUNIFORM 2**	1	UNIT BERUNIFORM 1	• WATANIAH 2, PISPA 2	• Mempamerkan kemahiran khusus bagi kursus berkaitan • Menunjukkan kepimpinan dan kerja berpasukan berdasarkan penguasaan kemahiran dan amalan positif.
3	**UNIT BERUNIFORM 3**	0	UNIT BERUNIFORM 2	• WATANIAH 3, PISPA 3	• Mempamerkan kemahiran khusus bagi kursus berkaitan • Menunjukkan kepimpinan dan kerja berpasukan berdasarkan penguasaan kemahiran dan amalan positif.
4	**UNIT BERUNIFORM 4**	0	UNIT BERUNIFORM 3	• WATANIAH 4, PISPA 4	• Mempamerkan kemahiran khusus bagi kursus berkaitan • Menunjukkan kepimpinan dan kerja berpasukan berdasarkan penguasaan kemahiran dan amalan positif.

LATIHAN INDUSTRI (LI)

LATIHAN INDUSTRI (LI)

MAKLUMAT AM

LATIHAN INDUSTRI DUT410110 adalah satu syarat wajib bagi pelajar dalam program-program tertentu di semua peringkat pengajian tinggi di Institut Pengajian Tinggi (IPT). Untuk meningkatkan tahap mampu kerja para graduan, program LI diperkenalkan untuk memperkasa kompetensi yang diperlukan. Kursus LI memberi pelajar peluang pembelajaran di dunia pekerjaan untuk menerima pengalaman praktikal supaya dapat mempertingkatkan kebolehpasarannya.

Kursus ini memberi pendedahan dan pengalaman kepada pelajar dari segi perkembangan teknologi, komunikasi yang berkesan, amalan kerja berpasukan, polisi-polisi, prosedur dan peraturan-peraturan, perspektif professional dan pelaporan. Kursus ini akan membina semangat dan sikap yang proaktif di kalangan pelajar dan seterusnya meningkatkan keyakinan mereka untuk menjadi pelatih yang cemerlang.

SYARAT KELAYAKAN LATIHAN INDUSTRI

1.Telah mendaftar kursus Latihan Industri.

2.Mendapat Kedudukan Baik (KB) atau Kedudukan Bersyarat (KS) dalam perpiriksaan semester sebelumnya.

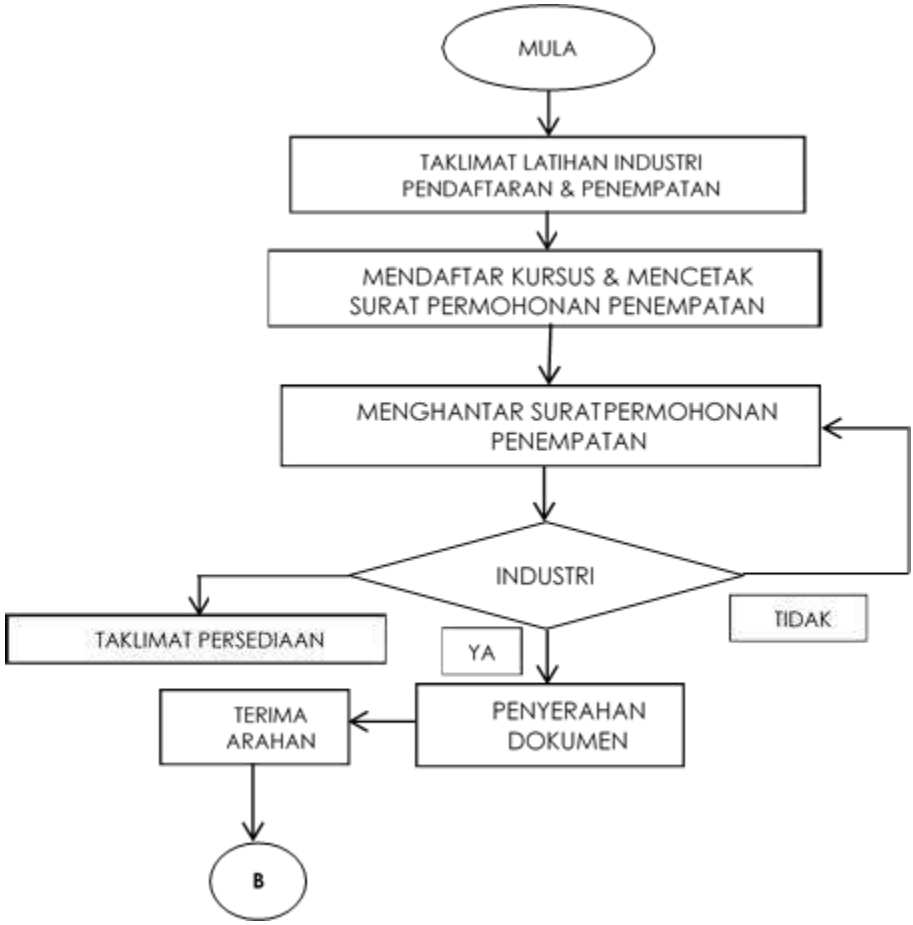
3.Bagi kursus Latihan Industri Semester Akhir (LISA) pelajar perlu lulus semua kursus yang diambil seperti disyaratkan dalam struktur program berkenaan dengan mendapat HPNM 2.0 dan ke atas.

4.Dilindungi Insurans.

5.Telah menduduki dan lulus kursus-kursus prasyarat yang ditetapkan.

6.Memenuhi lain-lain arahan yang ditetapkan oleh politeknik.

CARTA ALIR PROSES PERMOHONAN LI



PEPERIKSAAN DAN PENILAIAN

PANDUAN PENDAFTARAN KURSUS

MENDAFTAR KURSUS

1. Pendaftaran kursus akan dilaksanakan pada setiap awal semester dalam tempoh selewat-lewatnya TUJUH (7) hari dari tarikh rasmi sesi pengajian bermula setelah urusan melapor diri selesai.
2. Pelajar hendaklah mencukupkan jumlah kredit yang dibenarkan dengan menambah kursus-kursus lain yang ditawarkan pada semester semasa.
3. Ketua Jabatan Akademik bertanggungjawab untuk memastikan pelajar telah mendaftar kursus.
4. Bagi kes yang melibatkan pelajar berpindah daripada politeknik lain, segala urusan pendaftaran pelajar perlu diselesaikan oleh Jabatan Hal Ehwal Pelajar merujuk kepada Panduan Pengambilan dan Pengurusan Pelajar Politeknik sebelum pendaftaran kursus dilaksanakan di jabatan.

KREDIT KURSUS

1. Kredit bagi setiap kursus adalah seperti yang termaktub di dalam Dokumen Kurikulum dan Struktur Program yang sedang berkuatkuasa seperti yang diluluskan oleh Lembaga Kurikulum Kursus Pengajian Program dan Latihan Politeknik.
2. Jumlah kredit yang perlu diambil oleh pelajar bagi setiap semester adalah diantara DUA BELAS (12) hingga DUA PULUH (20) atau seperti yang ditetapkan di dalam Dokumen Kurikulum dan Struktur Program.
3. Jumlah kredit minimum yang perlu dikumpul oleh pelajar sebelum layak dipertimbangkan untuk penganugerahan Sijil Akademik adalah seperti mana yang ditetapkan di dalam Dokumen Kurikulum dan Struktur Program

MENGGUGUR KURSUS

1. Pelajar boleh menggugur sesuatu kursus dengan syarat jumlah kredit kursus-kursus yang masih diambil tidak kurang daripada DUA BELAS (12) kredit.
2. Pengguguran kursus boleh dibuat pada minggu ke TIGA (3) sehingga minggu ke ENAM (6) sesi pengajian. Pelajar hendaklah terlebih dahulu mendapatkan nasihat dan sokongan daripada Penasihat Akademik dan/atau Ketua Program serta mendapat kelulusan Ketua Jabatan Akademik.
3. Selepas daripada tempoh yang ditetapkan, pelajar tidak dibenarkan membuat sebarang pengguguran kursus.

MENGULANG KURSUS

1. Bagi pelajar yang gagal kursus wajib, kursus teras dan kursus pengkhususan hendaklah;
    a. mengulang kursus bagi mana-mana kursus yang disyaratkan ke atasnya pada semester berikut sekiranya kursus itu ditawarkan kecuali pada keadaan-keadaan yang tidak memungkinkan pelajar berbuat demikian dan mendapat kelulusan daripada Ketua Jabatan Akademik;
    b. mengikuti semula aktiviti-aktiviti pembelajaran bagi kursus-kursus berkenaan sepenuhnya.
2. Bagi pelajar yang gagal kursus elektif hendaklah;
    a. mengulang semula kursus elektif yang gagal, sama ada mengambil kursus elektif yang sama ATAU mana-mana kursus elektif yang lain pada semester berikut sekiranya kursus itu ditawarkan kecuali pada keadaan-keadaan yang tidak memungkinkan pelajar berbuat demikian dan mendapat kelulusan daripada Ketua Jabatan Akademik; dan
    b. memenuhi keperluan jam kredit minimum kursus elektif berdasarkan program standard atau manual kurikulum;
    c. mengikuti semula aktiviti-aktiviti pembelajaran bagi kursus-

kursus berkenaan sepenuhnya.

3. Bagi kes pelajar yang akan menjalani kursus Latihan Industri pada semester akhir yang gagal DUA (2) atau lebih kursus pada semester sebelumnya dikehendaki mengulang kursus yang gagal pada semester semasa.

MEMPERBAIKI GRED KURSUS

Bagi pelajar yang mendapat Lulus dengan gred C-, D+ dan D bagi mana-mana kursus;

a. Pelajar dibenarkan untuk memperbaiki gred kursus hanya sekali sahaja sepanjang pengajian bagi kursus tersebut kecuali bagi kursus-kursus WBL.
b. Pelajar perlumengikuti semula aktiviti-aktiviti pembelajaran bagi kursus-kursus berkenaan sepenuhnya pada mana-mana semester berikutnya termasuk semester pendek.
c. Keputusan bagi pelajar yang memperbaiki gred kursus akan diambil dari gred terbaik.
d. Jumlah kredit yang perlu diambil oleh pelajar yang memperbaiki Gred Kursus tidak boleh melebihi DUA PULUH (20) kredit kecuali pada keadaan-keadaan yang tidak memungkinkan pelajar berbuat demikian dan mendapat kelulusan Ketua Jabatan Akademik.

PROSES PENDAFTARAN KURSUS PELAJAR

GARIS PANDUAN UNTUK PENGECUALIAN DAN PEMINDAHAN KREDIT

PINDAHAN KREDIT DAN PENGECUALIAN KURSUS

Pindahan kredit dan pengecualian kursus boleh dipohon dalam tempoh TIGA (3) minggu semester pertama perkuliahan sekiranya memenuhi kriteria yang ditetapkan di dalam Garis Panduan Pindahan Kredit dan Pengecualian Kursus Program Pengajian

Politeknik Kementerian Pendidikan Tinggi yang boleh didapati melalui laman web PTSN (www.ptsn.edu.my).

PANDUAN AKADEMIK

SISTEM NILAIAN MATA

1. Sistem penilaian Politeknik Malaysia adalah berdasarkan kaedah penilaian kuantitatif prestasi pelajar di dalam sesuatu program yang dikenali sebagai Sistem Nilaian Mata (SNM).
2. Mengikut SNM, prestasi pelajar bagi sesuatu kursus adalah berdasarka kepada Sistem Gred yang mana pencapaian pelajar dinilai menggunakan dua (2) ukuran iaitu: i. Purata Nilaian Mata (PNM) atau Grade Point Average (GPA); dan
   ii. Himpunan Purata Nilaian Mata (HPNM) atau Cumulative Grade Point Average (CGPA).
3. Nilaian mata bagi kursus Kokurikulum pelajar Atlit adalah seperti berikut:
   i. Atlit yang mendapat pingat dan mewakili negeri/negara, nilai mata bagi kursus Kokurikulum berkenaan adalah 4.00;
   ii. Atlit yang mewakili negeri/negara yang tidak mendapat pingat, nilai mata bagi kursus Kokurikulum berkenaan adalah 3.00;
   iii. Atlit yang mewakili negeri/negara setelah melepasi semester DUA (2) dan TIGA (3), akan diberikan pindahan kredit sebanyak TIGA (3) kredit bagi subjek elektif;
   iv. Disahkan oleh Jawatankuasa Peperiksaan Politeknik.

SISTEM GRED

Markah yang diperolehi oleh pelajar di dalam sesuatu kursus akan diberi nilai mata dan gred mengikut kumpulan seperti berikut:

Markah	Nilai Mata	Gred	Status*
90-100	4.00	A+	Sangat Cemerlang
80-89	4.00	A	Cemerlang
75-79	3.67	A-	Kepujian
70-74	3.33	B+	Kepujian
65-69	3.00	B	Kepujian
60-64	2.67	B-	Lulus
55-59	2.33	C+	Lulus
50-54	2.00	C	Lulus
47-49	1.67	C-	Lulus
44-46	1.33	D+	Lulus
40-43	1.00	D	Lulus
30-39	0.67	E	Gagal
20-29	0.33	E-	Gagal
0-19	0.00	F	Gagal

Nota : *Status gred tidak terpakai bagi program-program tertentu

PEMBERATAN PENILAIAN KERJA KURSUS DAN PEPERIKSAAN AKHIR

1. Penilaian terhadap setiap kursus dibuat secara berkala dan berterusan dalam tempoh pengajian pada sesuatu semester merujuk kepada kaedah yang ditentukan oleh dokumen kurikulum.
2. Kursus-kursus yang tidak melibatkan peperiksaan akhir akan dinilai secara 100% kerja kursus.
3. Bagi kursus yang dinilai berdasarkan penilaian kerja kursus dan peperiksaan akhir, penilaian kursus adalah merujuk kepada dokumen kurikulum yang sedang berkuatkuasa.

PERATURAN AM KAEDAH PENILAIAN

Pelajar hendaklah memenuhi syarat-syarat berikut sebelum layak untuk dinilai prestasi akademiknya:

a. telah mendaftar/melapor diri untuk mengikuti pengajian;
b. telah mendaftar kursus berkenaan; dan
c. telah mencapai kehadiran 80% atau seperti yang ditetapkan bagi aktiviti pembelajaran yang diwajibkan bagi sesuatu kursus.

MENENTUKAN JUMLAH KREDIT

1. Jumlah kredit yang boleh diambil oleh pelajar bagi sesuatu semester adalah seperti dinyatakan pada perkara 2. Kredit Kursus.
2. Pelajar boleh mengambil jumlah kredit kurang daripada dua belas (12) sekiranya memenuhi mana-mana satu syarat di bawah:
    a. pelajar yang akan menjalani Latihan Industri pada semester berikutnya; atau
    b. pelajar mengikuti semester pendek; atau

c. pelajar Kursus Secara Sambilan (KSS), atau apa-apa program seumpamanya; atau
d. pelajar mendapat keputusan Kedudukan Bersyarat (KS) pada semester sebelumnya;
e. dan hendaklah mendapat: sokongan Penasihat Akademik; dan kelulusan Ketua Jabatan Akademik.

3. Pelajar boleh mengambil jumlah kredit melebihi daripada dua puluh (20) sekiranya memenuhi mana-mana satu syarat di bawah:
    a. pelajar yang akan menjalani Latihan Industri pada semester berikutnya; atau
    b. pelajar telah lulus semua kursus pada semester sebelumnya; dan mendapat HPNM bersamaan atau lebih daripada 3.00 pada semester sebelumnya;
    c. dan hendaklah mendapat: sokongan Penasihat Akademik; dan kelulusan Ketua Jabatan Akademik.
4. Pelajar hendaklah mencukupkan jumlah kredit minimum bagi setiap semester dengan mengambil kursus-kursus elektif yang ditawarkan pada semester berkenaan atau kursus- kursus lain dengan kelulusan Ketua Jabatan Akademik
5. Pelajar bertanggungjawab menyemak jumlah kredit terkumpul agar boleh menamatkan pengajian dalam tempoh yang ditentukan.

MENDUDUKI PEPERIKSAAN AKHIR

1. Pelajar hendaklah menduduki peperiksaan akhir bagi kursus- kursus yang memerlukannya berbuat demikian.
2. Tempoh peperiksaan akhir bagi sesuatu kursus adalah bergantung kepada tahap pengajian dan mata kredit bagi kursus berkenaan.

LAYAK MENERUSKAN PENGAJIAN

1. Pelajar yang mendapat keputusan Kedudukan Baik (KB) dan Kedudukan Bersyarat (KS) adalah layak meneruskan pengajian ke semester berikutnya.
2. Pelajar yang layak menjalani Latihan Industri perlu memenuhi syarat-syarat yang dinyatakan dalam Garis Panduan Pengurusan Dan Kaedah Penilaian Latihan Industri Politeknik.

PENGANUGERAHAN

Pelajar dianggap telah menamatkan pengajian dan layak dianugerahkan Sijil bagi sesuatu program yang ditetapkan sekiranya telah memenuhi kriteria berikut:

a. lulus semua kursus yang ditetapkan bagi program berkenaan;
b. mendapat HPNM bersamaan atau lebih daripada 2.00;
c. memperolehi sepenuhnya jumlah kredit yang ditetapkan bagi sesuatu program; dan
d. telah diperakui oleh Lembaga Peperiksaan dan Penganugerahan Sijil/Diploma Politeknik.

KATEGORI KEPUTUSAN PENILAIAN

Keputusan Penilaian bagi setiap semester akan dikategorikan kepada:

1. Lulus Penuh (LP)
   Pelajar semester akhir yang memperolehi HPNM bersamaan atau lebih daripada 2.00 dan memenuhi syarat serta layak dianugerahkan Sijil Akademik.
2. Kedudukan Baik (KB)
   Pelajar memperolehi HPNM bersamaan atau lebih daripada 2.00

3. Kedudukan Bersyarat (KS)
   Pelajar memperolehi HPNM bersamaan atau lebih daripada 1.60 dan kurang daripada 2.00

4. Gagal dan Diberhentikan (GB)
   Kedudukan Gagal dan Diberhentikan akan diberikan kepada pelajar yang:
   i. memperolehi HPNM kurang daripada 1.60; atau
   ii. memperolehi PNM kurang daripada 1.00 kecuali bagi pelajar yang akan menjalani LI pada semester berikutnya, pelajar yang mengikuti semester pendek, pelajar KSS atau apa-apa program seumpamanya; atau
   iii. gagal sesuatu kursus sebanyak **TIGA (3)** kali termasuk peperiksaan akhir khas atau penilaian khas atau semester pendek; atau
   iv. memperolehi keputusan KS **TIGA (3)** kali berturut- turut tidak termasuk semester pendek; atau
   v. gagal Latihan Industri sebanyak **DUA (2) kali**; atau
   vi. gagal kursus yang sama semasa WBL **DUA (2)** kali; atau
   vii. telah melampaui tempoh maksimum pengajian sesuatu program.

PEPERIKSAAN AKHIR KHAS DAN PENILAIAN KHAS

1. Peperiksaan Akhir Khas
   a. Pelajar yang layak dipertimbangkan untuk menduduki Peperiksaan Akhir Khas adalah pelajar seperti berikut:

i. disahkan sakit oleh pegawai perubatan kerajaan atau hospital swasta;

ii. menghadapi kes-kes kecemasan seperti kes kematian keluarga terdekat, kemalangan, bencana alam atau kebakaran dengan pengesahan dari pihak berkuasa; atau

iii. menyertai aktiviti yang diluluskan oleh Pengarah dengan mengemukakan surat pengesahan daripada pihak penganjur; atau

iv. atlit sukan yang sedang mewakili negeri atau negara.

b. Peperiksaan Akhir Khas juga dilaksanakan sekiranya Peperiksaan Akhir bagi mana-mana kursus pada semester berkenaan dibatalkan.

c. Peperiksaan Akhir Khas akan diadakan pada masa dan tarikh yang sesuai selepas peperiksaan akhir kursus berkenaan bagi pelajar dan dipersetujui oleh Pegawai Peperiksaan.

d. Sekiranya pelajar tidak hadir dengan sebab yang munasabah, markah **SIFAR (0)** akan diberikan bagi Peperiksaan Akhir Khas tersebut dan markah penilaian hanya akan dikira berdasarkan markah penilaian kerja kursus sahaja.

e. Sekiranya pelajar tidak hadir tanpa sebab, pelajar akan diberi Gred F dengan Nilai Mata 0.00 bagi kursus berkenaan. Pelajar dikira telah mengambil dan gagal kursus berkenaan.

2. Penilaian Khas

a. Penilaian Khas adalah satu bentuk penilaian yang hanya dibenarkan kepada pelajar yang akan menjalani kursus Latihan Industri pada

semester akhir yang memenuhi syarat-syarat berikut: mendapat keputusan KB;

i. gagal **SATU (1)** kursus sahaja pada semester sebelumnya;
ii. telah menduduki peperiksaan akhir bagi kursus berkenaan dalam semester semasa (jika berkaitan);
iii. tidak dikenakan tindakan tatatertib; dan
iv. telah diperakukan oleh Jawatankuasa Peperiksaan Politeknik.
v. Keputusan pelajar yang lulus Penilaian Khas akan mendapat Gred C sahaja.

b. Kaedah Penilaian Khas hendaklah ditentukan oleh Ketua Jabatan Akademik sama ada dengan:
   i. menduduki Peperiksaan Akhir sahaja; atau
   ii. menduduki Peperiksaan Akhir dan melaksanakan Penilaian Kerja Kursus; atau
   iii. melaksanakan sepenuhnya Penilaian Kerja Kursus.
c. Bagi pelajar yang gagal mana-mana kursus yang melibatkan Penilaian Kerja Kursus sahaja, penetapan sama ada pelajar perlu melaksanakan penilaian khas atau mengulang kursus diputuskan oleh Jawatankuasa Peperiksaan Politeknik.
d. Pelaksanaan penilaian khas perlu dilaksanakan dalam tempoh SATU (1) hingga EMPAT (4) minggu.
e. Pelajar perlu mendaftar untuk kursus yang berkenaan.
f. Penilaian Khas tidak layak bagi pelajar yang mengambil semester pendek dan kursus-kursus yang dilaksanakan secara WBL.
g. Penilaian Khas akan dilaksanakan selepas

mesyuarat Jawatankuasa Peperiksaan Politeknik.

RAYUAN KEPUTUSAN PEMARKAHAN

RAYUAN KE ATAS KEPUTUSAN PENILAIAN

1. Pelajar yang ingn membuat rayuan ke atas keputusan penilaiannya boleh berbuat demikian secara bertulis kepada Jawatankuasa Peperiksaan Politeknik dalam tempoh **EMPAT BELAS (14)** hari dari tarikh keputusan rasmi. Rayuan hendaklah disertakan dengan alasan-alasan yang munasabah dan bukti-bukti berkaitan.elajar akan dikenakan bayaran sebanyak RM50.00 bagi setiap rayuan yang dikemukakan dan hendaklah dibuat dalam bentuk Kiriman Wang/Wang Pos atas nama "PENGARAH POLITEKNIK TUN SYED NASIR SYED ISMAIL".

PENYEMAKAN SEMULA SKRIP JAWAPAN PEPERIKSAAN AKHIR

1. Pelajar yang ingn membuat penyemakan semula skrip jawapan sesuatu kursus hendaklah mengemukakan permohonan secara bertulis kepada Jawatankuasa Peperiksaan Politeknik dalam tempoh **EMPAT BELAS (14)** hari dari tarikh keputusan rasmi diumumkan.
2. Pelajar akan dikenakan bayaran sebanyak RM25.00 bagi setiap kursus dan hendaklah dibuat dalam bentuk Kiriman Wang/Wang Pos atas nama "PENGARAH POLITEKNIK TUN SYED NASIR SYED ISMAIL".

KEPUTUSAN RAYUAN DAN SEMAKAN SEMULA SKRIP JAWAPAN

Keputusan rayuan dan semakan semula skrip jawapan akan

dimaklumkan kepada pelajar oleh Pegawai Peperiksaan mengikut tarikh keputusan rasmi rayuan. Keputusan rayuan adalah muktamad

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