

POLITEKNIK
MALAYSIA



KEMENTERIAN PENGAJIAN TINGGI



KOLEJ KOMUNITI
MALAYSIA

PANDUAN KURIKULUM

**BAGI PROGRAM
KEJURUTERAAN ELEKTRIK
DAN ELEKTRONIK**



**EDISI
KEDUA**

Panduan Kurikulum bagi Program Kejuruteraan Elektrik dan Elektronik

Hakcipta terpelihara

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Panduan ini menerangkan kurikulum bagi Program Kejuruteraan Elektrik dan Elektronik, Jabatan Pendidikan Politeknik dan Kolej Komuniti, Kementerian Pengajian Tinggi. Panduan ini perlu dibaca bersama dengan standard Program, *Engineering Technology Accreditation Council (ETAC)*, *Malaysian Qualification Framework (MQF)*, *Code of Practice for Programme Accreditation (COPPA)* second Edition dan Dokumen Kurikulum.

Terbitan

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DOKUMEN INI TERPAKAI BAGI KURIKULUM
PROGRAM KEJURUTERAAN ELEKTRIK

Jawatankuasa Pembangunan Panduan Kurikulum bagi Program Kejuruteraan
Elektrik dan Elektronik (Edisi Kedua)

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Objektif buku Panduan Kurikulum bagi Program Kejuruteraan Elektrik dan Elektronik

Tujuan Panduan Kurikulum bagi Program Kejuruteraan Elektrik dan Elektronik ini adalah:

- i. Sebagai panduan untuk memudahkan Ketua Jabatan dan pensyarah di institusi untuk memahami dan menggunakan dokumen kurikulum.
- ii. Sebagai bahan rujukan bagi pensyarah bidang Kejuruteraan Elektrik dalam mengendalikan aktiviti pengajaran dan pembelajaran.
- iii. Memberi panduan kepada pensyarah bidang Kejuruteraan Elektrik sekali gus setiap pensyarah memberikan sudut pandangan yang sama berkaitan dokumen kurikulum bidang kejuruteraan elektrik
- iv. Memastikan interpretasi pensyarah berkaitan dengan dokumen kurikulum Program Kejuruteraan Elektrik dan Elektronik adalah sama di setiap institusi

BAB 1: PENGENALAN

1.1 Pendahuluan

Kurikulum politeknik di Malaysia dari semasa kesemasa melalui proses transformasi yang diperkukuhkan dengan melalui proses semakan dan tambahbaik mengikut keperluan standard akreditasi terkini dan industri semasa. Proses ini dilaksanakan untuk menjamin kualiti dan kelestarian program disamping untuk menghasilkan kurikulum yang dinamik, relevan dengan keperluan semasa serta bersedia menghadapi cabaran yang akan datang.

Sejajar dengan itu, bagi mengekalkan kualiti program, Jawatankuasa Lembaga Kurikulum bertanggungjawab untuk meluluskan kurikulum program pengajian politeknik. Pada tahun 2019 terdapat sembilan (9) program diploma dan satu program pengajian sarjana muda dan di Jabatan Kejuruteraan Elektrik (JKE) yang telah diluluskan oleh Lembaga Kurikulum dan berkuatkuasa untuk penawaran di politeknik hasil dari semakan semula kurikulum masing – masing bermula pada sesi Jun 2019 dengan pelaksanaan serentak dan sesi September 2019.

Senarai program di Jabatan Kejuruteraan Elektrik adalah seperti berikut:

- a. Diploma Kejuruteraan Elektrik
- b. Diploma Kejuruteraan Elektrik (Tenaga Hijau)
- c. Diploma Kejuruteraan Elektrik (Kecekapan Tenaga)
- d. Diploma Kejuruteraan Elektrik & Elektronik
- e. Diploma Kejuruteraan Elektronik (Kawalan)
- f. Diploma Kejuruteraan Elektronik (Komputer)
- g. Diploma Kejuruteraan Elektronik (Komunikasi)
- h. Diploma Kejuruteraan Elektronik (Optoelektronik)
- i. Diploma Kejuruteraan Elektronik (Perubatan)
- j. Sarjana Muda Teknologi Kejuruteraan Elektronik (Elektronik Perubatan) Dengan Kepujian

Rekabentuk kurikulum politeknik digubal dengan mengikut pendekatan *Outcome Based Education* (OBE) dan merujuk kepada garis panduan serta standard program yang dikeluarkan oleh Agensi Kelayakan Malaysia / *Malaysian Qualifications Agency*, (MQA) dan Lembaga Jurutera Malaysia

(LJM) / *Board of Engineers Malaysia* (BEM) melalui Majlis Akreditasi Teknologi Kejuruteraan / *Engineering Technology Accreditation Council* (ETAC).

Terdapat dua bentuk penawaran program di Jabatan Kejuruteraan Elektrik iaitu secara konvensional dan *Work Based Learning* (WBL) masing –masing untuk program diploma dan ijazah sarjana muda.

1.2 Sejarah Akreditasi

Pada peringkat awal semua politeknik dibawah naungan Jabatan Pengajian Politeknik (JPP) telah diakreditasi oleh badan berkanun yang dikenali sebagai Lembaga Akreditasi Negara (LAN). Akan tetapi LAN telah dibubarkan pada tahun 2007, Oleh yang demikian fungsinya telah diambil alih oleh sebuah Agensi Kelayakan Malaysia (MQA). Sejak dari itu, JPP telah berusaha untuk mendapatkan akreditasi daripada MQA untuk semua program yang ditawarkan di seluruh politeknik Malaysia. Status akreditasi penuh oleh MQA telah dicapai sepenuhnya pada tahun 2013. Sejarah proses akreditasi untuk semua program di politeknik adalah seperti yang ditunjukkan dalam **Jadual 1.2 (a)**.

Jadual 1.2(a): Sejarah Program Akreditasi politeknik oleh agensi LAN, MQA dan ETAC

Bil	Tahun	Agensi Akreditasi
1	2004 - 2009	Lembaga Akreditasi Negara Malaysia (LAN)
2	2010 - 2012	<i>Deemed accreditation</i> oleh MQA
3	2013	<i>Full accreditation</i> oleh MQA
4	2018	Bermula Akreditasi ETAC

Sehubungan itu, terdapat sembilan bidang utama dalam jaminan kualiti yang digariskan oleh Agensi MQA. Salah satu bidang yang ditekankan adalah Penambahbaikan Kualiti Berterusan (CQI). Pihak MQA amat menekankan supaya Pemberi Pendidikan Tinggi (PPT) agar melaksanakan langkah penambahbaikan terhadap penawaran program secara berterusan dalam meningkatkan kualiti program. Tujuan utama adalah memastikan kurikulum

sentiasa relevan kepada keperluan pelajar, industri, pemegang taruh dan perubahan semasa.

Dalam memastikan kualiti program pengajian dicapai dan dipertingkatkan, Dasar dan Prinsip Jaminan Kualiti Program Pengajian Jabatan Pendidikan Politeknik (Pindaan Pertama, 2014), para 5.8, menyatakan bahawa semakan semula kurikulum dijalankan seawal setahun selepas sesuatu kurikulum program pengajian ditawarkan atau selewat-lewatnya satu tahun selepas satu kitaran program pengajian berkenaan.

Jabatan Pendidikan Politeknik (JPP) melalui Bahagian Pembangunan Kurikulum (BPK) sentiasa merancang penambahbaikan terhadap kurikulum program pengajian politeknik yang ditawarkan bagi mencapai aspirasi politeknik sebagai peneraju dalam bidang Pendidikan dan Latihan Teknikal dan Vokasional (TVET) negara. Justeru itu melalui Mesyuarat Lembaga Kurikulum (MLK) Kursus Pengajian dan Program Latihan di Politeknik, Kementerian Pendidikan Malaysia (KPM) Bil. 1/2014 telah meluluskan kurikulum program pengajian peringkat diploma yang telah disemak semula. Skop penambahbaikan pada masa itu adalah:

- a. Pematuhan kepada Standard Program MQA
- b. Pematuhan kepada Dasar Jaminan Kualiti berkaitan Mata Pelajaran Umum (MPU)
- c. Semakan semula *Programme Learning Outcomes* (PLO)
- d. Semakan semula *Course Learning Outcomes* (CLO)
- e. Memasukkan jam Peperiksaan Akhir di dalam pengiraan *Student Learning Time* (SLT) bagi pengiraan kredit kursus
- f. Menggabungkan kursus-kursus yang sesuai bagi menaikkan nilai kredit kursus dan mengurangkan bilangan jumlah kursus sesuatu program
- g. Nisbah peratusan peperiksaan akhir kepada penilaian berterusan dan
- h. Mengkaji semula bilangan pentaksiran bagi setiap kursus.

Kurikulum ini telah diguna pakai mulai sesi Jun 2014 dan akan memenuhi satu kitaran pada penghujung sesi Disember 2016. Dalam masa pelaksanaan kurikulum versi berkenaan, BPK sentiasa menerima pelbagai maklum balas mengenai penambahbaikan yang masih perlu dilakukan serta berlaku beberapa perubahan dalam sistem dan juga permintaan daripada pemegang taruh.

Sebagai organisasi pendidikan yang dinamik terhadap perubahan semasa, BPK telah merangka aktiviti penambahbaikan kali kedua terhadap kurikulum semua program yang terlibat bermula pada tahun 2017.

Mulai tahun 2018 semua Institusi Pengajian Tinggi Awam dan Swasta yang menjalankan Program Pengajian Teknologi Kejuruteraan dan Juruteknik Kejuruteraan supaya memohon akreditasi kelayakan dengan BEM melalui ETAC bagi membolehkan graduan diiktiraf sebagai Teknologi Kejuruteraan dan Juruteknik Kejuruteraan. Setelah memenuhi syarat yang ditetapkan, pelajar lulusan Teknologi Kejuruteraan dan Juruteknik Kejuruteraan selanjutnya membolehkan graduan berdaftar sebagai Teknologis Kejuruteraan dan Inspector of Works seterusnya melayakkan mereka memberi perkhidmatan penyeliaan kerja kejuruteraan secara sah di negara ini.

Justeru itu melalui Mesyuarat Bahagian Kurikulum bersama Ketua Pengarah Jabatan Pendidikan Politeknik dan Kolej Komuniti (JPPKK) pada 25 Mei 2018, Bahagian Kurikulum telah diberi kebenaran khas untuk menangguhkan pelaksanaan kurikulum versi 2019 bagi program pengajian peringkat diploma politeknik dari sesi Disember 2018 kepada sesi Jun 2019, bagi mengambil kira isu-isu pengurusan dan pengoperasian, perubahan ke atas Dasar Jaminan Kualiti *Malaysian Qualification Agency* (MQA) dan pematuhan kepada semua keperluan akreditasi ETAC.

1.3 Akreditasi Program

Selaras dengan Akta Parlimen (Akta 679) yang memberikan kuasa kepada MQA untuk pemakaian Kerangka Kelayakan Malaysia / *Malaysian Qualification Framework* (MQF). MQF merupakan rujukan utama kepada Pemberi Pendidikan Tinggi (PPT) dalam jaminan kualiti untuk membangun dan menawarkan program. MQF juga berperanan untuk memberi pentauliah program dan kelayakan pendidikan tinggi, untuk mengawasi dan mengatur kualiti dan standard penyedia pendidikan tinggi disamping mengawal selia Daftar Kelayakan Malaysia / *Malaysian Qualification Register*. Oleh hal yang demikian semua standard program perlu patuh kepada MQF.

Rekabentuk program pengajian diploma dan ijazah dalam bidang kejuruteraan elektrik dan elektronik adalah berpandukan kepada Kerangka

Kelayakan Malaysia (MQF) Edisi Kedua. Berdasarkan kepada Kerangka Kelayakan tersebut, domain-domain pembelajaran yang sediaada terkandung dalam lima (5) kluster yang diujarkan kepada dua belas (12) *Programme Learning Outcome* (PLO) standard ETAC.

Selain daripada itu, semasa proses pembangunan kurikulum kerangka ini dirujuk bagi mewujudkan keselarasan kursus-kursus yang ditetapkan untuk setiap program pengajian seperti kursus Wajib, Teras, Elektif dan Latihan Industri.

BAB 2: PEMBELAJARAN BERASASKAN HASIL / *OUTCOME BASED EDUCATION* (OBE)

2.0 Apa itu *Outcome Based Education* (OBE)

“Outcome-Based Education means clearly focusing and organizing everything in an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences. This means starting with a clear picture of what is important for students to be able to do, then organizing the curriculum, instruction, and assessment to make sure this learning ultimately happens” (Spady, 1994:1)

Oleh itu, *Outcome Based Education* (OBE) merupakan falsafah pendidikan yang memberi tumpuan terhadap hasil yang harus dicapai oleh pelajar. Hasil pembelajaran ini diukur berdasarkan pengetahuan dan kemampuan pelajar secara individu dengan pelbagai pendekatan yang berpusatkan pelajar. Hasil pembelajaran pelajar ini boleh diukur, dibuktikan dan diperbaiki. Terdapat empat (4) prinsip OBE yang terpakai dalam pengajaran dan pembelajaran (pdp) adalah seperti berikut:

a. Kejelasan Fokus / *Clarity of focus*

Pensyarah mesti jelas terhadap apa yang mereka hendak pelajar tahu, fahami, dan mampu laksanakan/tunjukkan untuk mencapai hasil pembelajaran. Pendidik perlu fokus dalam membantu pelajar utk membina pengetahuan, kemahiran dan personality yg dapat membantu mereka mencapai hasil yg ditetapkan dengan jelas.

b. Reka bentuk menurun / *Design down*

Reka bentuk kurikulum mesti bermula dengan mendefinisikan hasil pembelajaran dengan jelas yang perlu dicapai oleh pelajar di akhir program.

c. Jangkaan Tinggi / *High expectations*

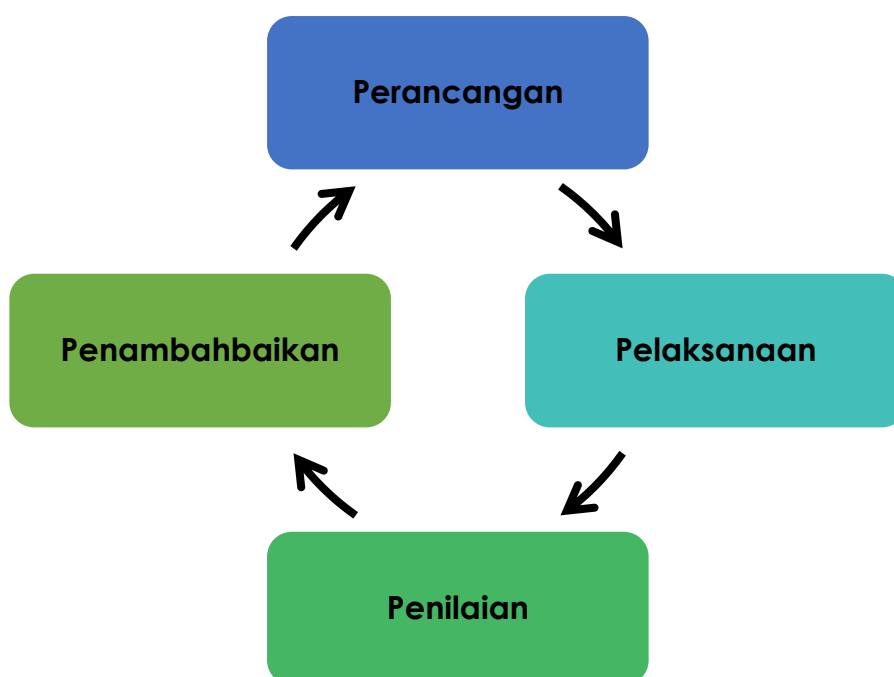
Pensyarah perlu mewujudkan tahap prestasi yang tinggi lagi mencabar kepada pelajar untuk menggalakkan mereka terlibat secara mendalam dalam sesi pembelajaran. Pelajar dapat menguasai CLO dan PLO apabila mereka mencapai markah penilaian melebihi 50%. Sekiranya baseline bagi

CQI CORR dan PLORR mencapai melebihi 50%, maka ia hendaklah ditingkatkan.

d. Peluang diperluaskan / Expanded opportunity

Menyediakan pelbagai peluang pembelajaran yang menepati keperluan dan teknik pembelajaran pelajar. Tidak semua pelajar dapat pelajari perkara yang sama dengan cara yang sama pada masa yang sama. Kebanyakan pelajar mampu mencapai standard yg lebih tinggi sekiranya mereka diberi peluang yang bersesuaian.

Selain daripada itu, hasil pembelajaran yang diperolehi perlu di analisis dan proses Penambahbaikan Kualiti Berterusan / *Continuous Quality Improvement* (CQI) perlu dilaksanakan untuk memastikan peningkatan pencapaian hasil program. Proses CQI kurikulum yang berasaskan OBE memfokuskan 4 proses berkitar yang mengandungi elemen perancangan untuk mereka bentuk kurikulum, pelaksanaan pengajaran dan pembelajaran, penilaian dan penambahbaikan kurikulum.



Rajah 2.1: Proses Perancangan Pelaksanaan OBE

BAB 3: PENAMBAHBAIKAN DAN PROSES PENGUBALAN KURIKULUM

3.0 Penambahbaikan Kualiti Berterusan Kurikulum

Penambahbaikan Kualiti berterusan / *Continual Quality Improvement* (CQI) adalah destinasi sebenar yang amat penting dalam pelaksanaan OBE. Proses ini merupakan satu keadaan yang perlu diwujudkan dalam setiap program pengajian yang ditawarkan. CQI merangkumi aspek perancangan dan pelaksanaan langkah dan aktiviti bagi memperbaiki kelemahan yang dikenalpasti dalam pelaksanaan semasa. Langkah-langkah penambahbaikan yang berterusan dan aspek kurikulum, proses PdP dan pentaksiran akan menentukan kejayaan sesuatu program bagi menghasilkan graduan berkualiti yang diharapkan.

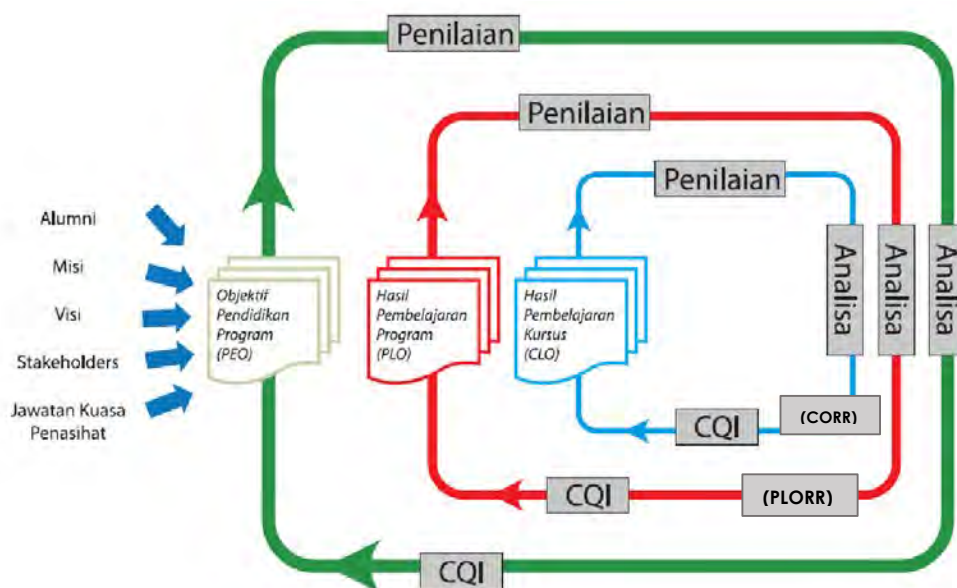
3.1 Proses Jaminan Kualiti

Penambahbaikan Kualiti Berterusan (CQI) adalah merupakan satu proses jaminan kualiti bertujuan untuk memastikan program pengajian yang ditawarkan kekal relevan, dinamik dan berdaya saing. Proses ini CQI ini, adalah bersifat kitaran dan melibatkan dua aktiviti utama iaitu pemantauan pelaksanaan program / *program monitoring* dan semakan kurikulum program / *curriculum review* yang perlu dilaksanakan secara sistematik diperingkat institusi.

Rajah 3.1 menunjukkan Model CQI bagi penambahbaikan bagi Hasil Pembelajaran Kursus / *Course Learning Outcome* (CLO), Hasil Pembelajaran Program / *Programme Learning Outcome* (PLO) dan *Objektif Program / Programme Educational Objective* (PEO) bagi satu program pengajian setelah dilaksanakan di peringkat politeknik. Penilaian terhadap CLO, PLO dan PEO dilaksanakan untuk mengukur tahap pencapaian pelajar terhadap *outcomes* yang telah ditetapkan.

CQI perlu dibuktikan dengan menyediakan satu laporan yang lengkap dengan data yang sah hasil daripada analisa pencapaian yang dilakukan. *Course Outcome Review Report* (CORR) dihasilkan oleh pensyarah kursus manakala *Programme Learning Outcome Review Report* (PLORR) dihasilkan oleh ketua program pengajian. Penambahbaikan atau semakan semula dibuat berdasarkan perbandingan analisis pencapaian PEO, PLO dan CLO

dengan sasaran / *target* yang telah ditetapkan serta input daripada pihak pemegang taruh / *stakeholder*.



Rajah 3.1: Model CQI bagi penambahbaikan CLO, PLO dan PEO

3.2 Proses Penambahbaikan Kurikulum

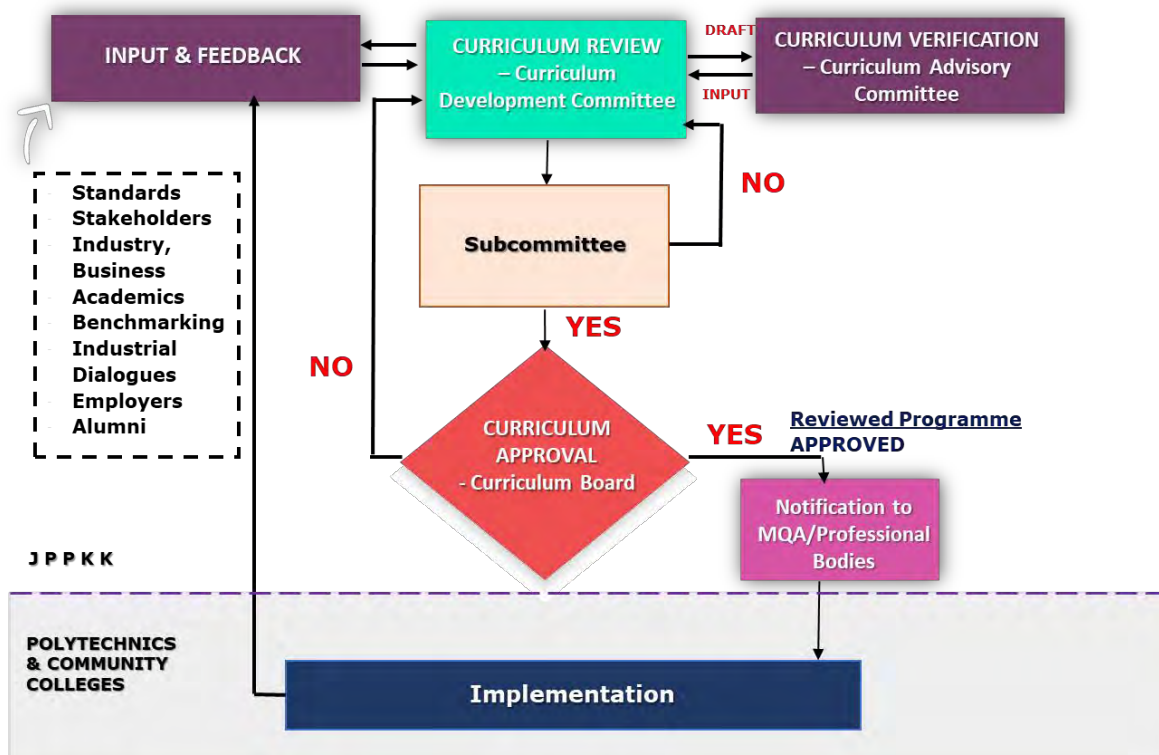
Politeknik – politeknik Malaysia diuruskan secara berpusat oleh Jabatan Pendidikan Politeknik dan Kolej Komuniti (JPPKK) dibawah Kementerian Pengajian Tinggi. Pengurusan ini adalah termasuk pembangunan kurikulum semua program yang ditawarkan di politeknik Malaysia. Pembangunan kurikulum adalah dibawah seliaan Bahagian Kurikulum, JPPKK.

Rajah 3.2 menunjukkan carta alir pembangunan kurikulum yang digunakan di bahagian kurikulum bagi proses pembangunan kurikulum program pengajian di politeknik. Pada peringkat awal, PEO dan PLO dibangunkan oleh Bahagian Kurikulum dengan merujuk kepada garis panduan MQF dan ETAC. Manakala kurikulum akademik dibangunkan oleh Jawatankuasa Penggubal Kurikulum / *Curriculum Development Committee (CDC)* yang terdiri daripada pensyarah pakar bidang dari politeknik. Pembangunan dan penambahbaikan kurikulum ini, adalah mengambil kira semua input dan maklumbalas daripada perubahan standard program, *bechmarking*, dialog industri dan pemegang taruh. Pemegang taruh adalah terdiri daripada:

- a. Kementerian Pengajian Tinggi (KPT) – Tadbir urus yang menentukan dasar pendidikan nasional dan perancangan pembangunan pendidikan.
- b. Pensyarah – ahli akademik yang terlibat secara langsung untuk proses pengajaran dan pembelajaran di jabatan kejuruteraan.
- c. Alumni – merupakan graduan lepasan institusi politeknik seluruhnya yang mencerminkan kualiti pendidikan mereka tersendiri. Kumpulan alumni ini adalah individu yang berjaya dan membawa pandangan dari pelbagai industri dan akademik.
- d. Industri / Majikan - kumpulan ini merupakan graduan yang kompeten dan produktif secara teknikal, mempunyai kemahiran yang baik dalam komunikasi, kerja berpasukan dan berkepimpinan serta mempunyai nilai etika yang tinggi terhadap kesedaran social dan persekitaran.

Seterusnya Jawatankuasa Penasihat Kurikulum / *Curriculum Advisory Committee* (CAC) yang dilantik oleh Bahagian Kurikulum terdiri daripada kumpulan pensyarah pakar bidang dan juga wakil – wakil industri. CAC akan menyemak dan memberi input seterusnya mengesahkan kurikulum yang telah dibangunkan oleh CDC.

Manakala, *Subcommittee* pula adalah ahli jawatankuasa yang dilantik dari pensyarah dan pegawai senior politeknik akan memastikan kurikulum memenuhi keperluan polisi dan piawaian sebelum dibawa ke Mesyuarat Lembaga Kurikulum (MLK) Politeknik. Ahli Lembaga Kurikulum yang terdiri daripada pengurusan tertinggi JPPKK, wakil badan professional dan ahli akademik dari IPTA dan IPTS adalah lantikan daripada Kementerian Pendidikan Malaysia yang berperanan untuk meluluskan kurikulum sebelum dilaksanakan di politeknik. Setelah kurikulum diluluskan, Bahagian Kurikulum akan memaklumkan kepada MQA atau badan professional bertauliah berkenaan tentang perubahan kurikulum hasil daripada CQI. Seterusnya kurikulum digunakan diseluruh politeknik yang terlibat.



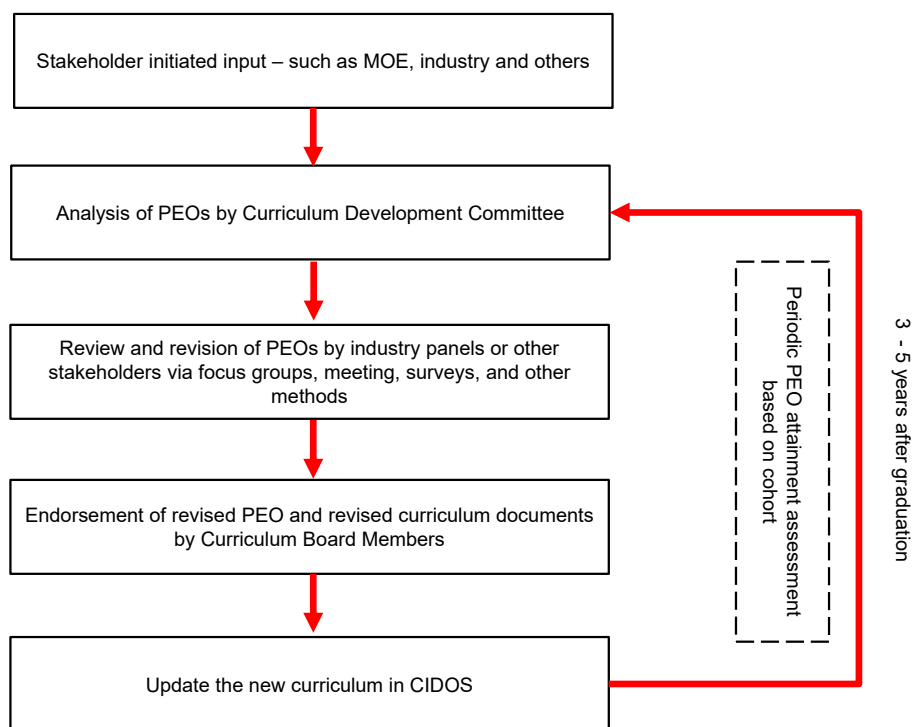
Rajah 3.2: Carta Alir Proses Semak semula Kurikulum

3.2.1 Proses Penambahbaikan PEO dan semakan berkala

CDC menganalisis input PEO dari KPM, Industri, pemegang kepentingan lain, maklum balas dari jawatankuasa penasihat program di politeknik dan pencapaian PEO untuk semakan semula PEO. Maklum balas digunakan untuk mengenal pasti jurang dan meningkatkan PEO agar sesuai dengan keperluan pihak berkepentingan. Pernyataan PEO yang disemak semula mesti dikaji semula oleh industri dan pihak berkepentingan lain untuk memastikan kesesuaiannya PEO yang disemak semula.

Pernyataan PEO dibangunkan berdasarkan oleh pernyataan pernyataan visi dan misi DPCCE, input dari KPM, jawatankuasa penasihat program, pihak berkepentingan lain dan pencapaian PEO. PEO disemak dan diperbaharui secara berkala oleh jabatan kurikulum melalui proses yang ditetapkan seperti yang ditunjukkan dalam **Rajah 3.3** CDC akan menganalisis input dan pencapaian PEO untuk mengenal pasti jurang dan meningkatkan PEO agar sesuai dengan keperluan pihak berkepentingan. Pengubahsuaian juga harus selaras dengan visi dan misi DPCCE. PEO yang disemak semula akan diserahkan kepada jawatankuasa Penasihat Program di peringkat politeknik dan pihak berkepentingan lain untuk semak semula dan memberi maklum

balas. PEO yang telah ditetapkan mesti mendapat persetujuan yang disahkan oleh PCB sebelum digunakan secara formal oleh politeknik. Penyebaran PEO dilakukan sebagai sebahagian daripada dokumen kurikulum melalui portal CIDOS.



Rajah3.3: Proses Penambahbaikan PEO dan semakan berkala

3.3 Pembangunan Kurikulum JKE versi 2019

Bahagian Kurikulum bersama-sama Jawatankuasa Penggubal Kurikulum bagi program bidang Kejuruteraan Elektrik dan Elektronik telah mula melaksanakan aktiviti semak dan penjajaran semula kurikulum sepanjang tahun 2018 hingga pertengahan tahun 2019. Maklumbalas telah diperolehi dari pelbagai pihak bagi tujuan penambahbaikan kurikulum politeknik. Sehubungan itu Bahagian Kurikulum telah merancang aktiviti penambahbaikan terhadap kurikulum semua program yang terlibat supaya dapat dilaksanakan dengan teratur dan sistematik.

Asas penambahbaikan kurikulum versi 2019 bagi program pengajian politeknik adalah mengambilkira keperluan berikut:

- a. *Malaysian Qualification Framework (MQF) 2.0 – 8 LOD kepada 5 Kluster Hasil Pembelajaran*
- b. *Code of Practice for Programme Accreditation (COPPA). Second Edition (2018)*
- c. *Engineering Technician Education Programme Accreditation Standard (2019)*
- d. *Standard programme serta Body of Knowledge*
- e. Maklumbalas daripada lawatan audit akreditasi dan pematuhan MQA
- f. Maklumbalas daripada lawatan audit akreditasi ETAC
- g. Maklumbalas dari industri serta badan professional
- h. Maklumbalas pensyarah
- i. Penerapan elemen hijau dalam kurikulum
- j. Penerapan 4IR/Industri 4.0 (*9 Pillars of Technological Advancement*)
- k. Pelaksanaan 14 minggu perkuliahan
- l. Format terkini kurikulum versi 2019

Di dalam *Engineering Technology Programme Accreditation Standard (ETAC)*, amat menekankan supaya pembekal pengajian tinggi melaksanakan langkah penambahbaikan terhadap penawaran program secara berterusan dalam meningkatkan kualiti program. Bagi memastikan kurikulum kekal relevan serta mencapai PLO, CLO dan OBE, kurikulum sedia ada yang sedang digunakan di politeknik perlu disemak dari semasa ke semasa bagi tujuan penambahbaikan berdasarkan beberapa perkara seperti berikut:

- a. Penulisan hasil pembelajaran yang lebih mantap.
- b. Pemetaan hasil pembelajaran yang lebih tepat.
- c. Kandungan silibus yang dikemaskini.
- d. Kaedah pengajaran dan pembelajaran yang lebih berkesan.
- e. Kaedah pentaksiran yang lebih sesuai.

CQI di peringkat program dan kursus di Jabatan Kejuruteraan Elektrik antara lain melibatkan penjajaran semula PLO program serta CLO dan kandungan silibus kursus. Kurikulum disusun dan ditulis semula secara jelas, teratur dan sistematik supaya prinsip OBE dan PLO program dapat di'embed' dan dikaitkan. Implikasi CQI kurikulum ini seterusnya akan menyeragamkan aras pemahaman dan interpretasi para pensyarah semasa proses implimentasi di peringkat politeknik.

BAB 4: REKABENTUK KURIKULUM DAN SPESIFIKASI

4.0 REKABENTUK PROGRAM/KURIKULUM

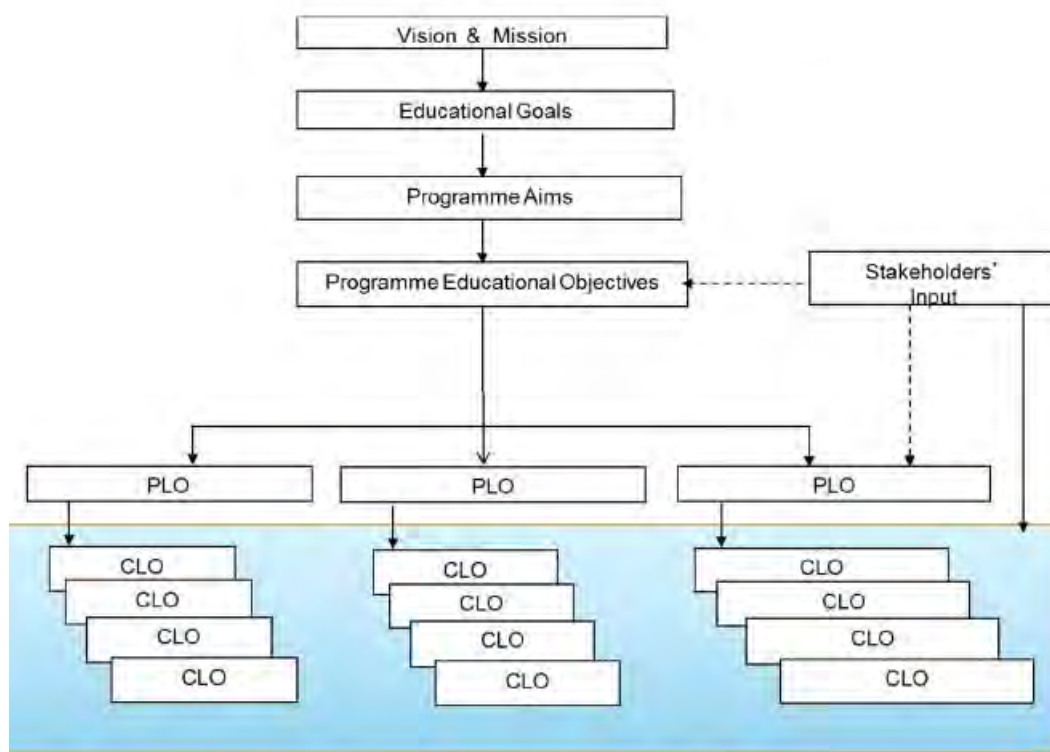
Rekabentuk kurikulum didefinisikan sebagai satu proses pembinaan peluang pembelajaran yang strategik berasaskan kompetensi yang diperlukan bagi membolehkan pelajar mencapai skop dan tahap yang bersesuaian bagi sesuatu disiplin pengajian. Mengikut prinsip teras kedua yang berdasarkan *Outcome Based Education* (OBE), titik permulaan bagi rekabentuk kurikulum bermula daripada hasil pembelajaran yang perlu dicapai oleh semua pelajar di akhir pembelajaran. Merujuk **Rajah 4.1**, konsep ini dikenali sebagai *Top Down Design* iaitu rekabentuk kurikulum yang bermula dari atas ke bawah.

Pendekatan rekabentuk kurikulum OBE ini bermula dengan membangunkan *Body of Knowledge* (BOK), penetapan visi, misi, *Educational Goal*, *Programme Aims* dan seterusnya *Programme Educational Objective* (PEO) yang dibangunkan adalah bagi membantu pencapaian visi dan misi institusi. Ini diikuti pula dengan pembangunan PLO yang akan membawa kepada perancangan hasil CLO bagi setiap kursus yang ditawarkan, dalam satu program yang dijarar dengan PLO. Oleh itu, semua keputusan tentang rekabentuk kurikulum seharusnya dijararkan dengan hasil pembelajaran PEO, PLO dan CLO yang telah ditetapkan.

Rekabentuk kurikulum program pengajian politeknik juga direkabentuk berdasarkan pendekatan OBE yang menjurus kepada pencapaian PEO, PLO dan CLO dimana ia :-

- i. Mematuhi Panduan Standard Program Diploma dan Kerangka Kelayakan Malaysia.
- ii. Pembelajaran berpusatkan pelajar.
- iii. Penguasaan pengetahuan dan kemahiran dalam bidang pengkhususan yang diikuti.
- iv. Penguasaan kemahiran softskill dan nilai.
- v. Penggunaan pelbagai kaedah pengajaran dan pembelajaran.
- vi. Penggunaan pelbagai kaedah pentaksiran.

Setiap pernyataan Visi, Misi, *Educational Goal*, *Programme Aims*, seterusnya PEO, PLO dan CLO, adalah dengan merujuk kepada dokumen kurikulum Versi 2019 serta merujuk standard program ETAC yang terkini.



Rajah 4.1: Rekabentuk Kurikulum OBE Top Down Design

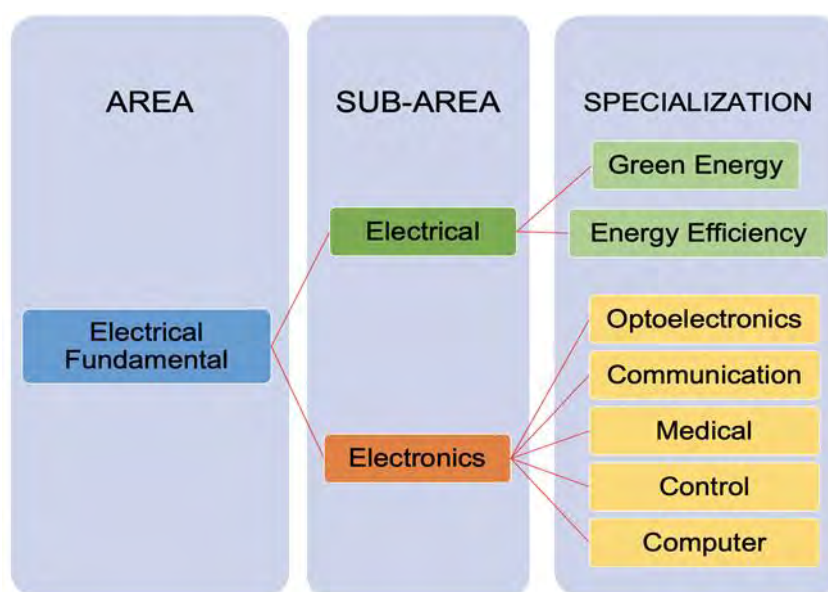
4.1 Body of Knowledge (BoK)

Rekabentuk program-program Kejuruteraan Elektrik & Elektronik yang ditawarkan di Jabatan Kejuruteraan Elektrik dibangunkan berpandukan kepada *Body of Knowledge (BoK)*, Kerangka Program Kejuruteraan Elektrik dan Elektronik Politeknik Malaysia seperti di dalam **Rajah 4.2**. Jawatankuasa Pembangunan Kurikulum membangunkan satu set lengkap BoK yang merangkumi konsep, terma, aktiviti dan *Program Outcomes* sehingga menghasilkan domain profesional yang di terima pakai oleh akademik dan industri. Kerangka BoK ini terdiri dari 5 komponen iaitu Teknikal, Pembangunan sendiri, Matematik, Sains dan kompeten di tempat kerja.

Personal Development	Languages	Religious/ Moral Studies	Co-curricula	Entrepreneurship
Mathematics	Mathematics			
Sciences	Sciences			
Technical	Electrical			
Workplace Competencies	Occupational Safety & Health	Industrial Training	WBL	

Rajah 4.2: General Body of Knowledge (BoK), Kerangka Program Kejuruteraan Elektrik dan Elektronik Politeknik Malaysia

Komponen teknikal bagi kejuruteraan elektrik seterusnya dibahagikan kepada tiga kategori iaitu Area, Sub-Area & Specialization yang ditunjukkan di dalam **Rajah 4.3**.



Rajah 4.3: Komponen Teknikal Kejuruteraan Elektrik

Kategori pertama adalah Area yang mana ia merangkumi kursus-kursus asas yang menjadi prinsip di dalam bidang Kejuruteraan elektrik dan elektronik bagi semua program yang ditawarkan di bawah Jabatan Kejuruteraan Elektrik. Jabatan Kejuruteraan Elektrik menawarkan dua program utama iaitu Diploma Kejuruteraan Elektrik dan Diploma Kejuruteraan Elektronik seperti yang ditunjukkan dalam kategori Sub-Area. Diploma Kejuruteraan Elektrik di bahagikan kepada dua bidang pengkhususan iaitu *Green Energy* dan *Energy Efficiency*. Manakala Diploma Kejuruteraan Elektronik di bahagikan kepada

lima bidang pengkhususan iaitu *Optoelectronic, Communication, Medical, Control* dan *Computer*.

4.2 Visi dan Misi

Visi dan Misi Jabatan pendidikan Politeknik dan Kolej Komuniti (JPPKK) adalah merupakan unsur utama bagi perancangan strategik yang menetapkan hala tuju organisasi untuk mencapai kejayaan dalam jangka yang panjang. Manakala misi pula merupakan satu pernyataan ringkas tentang matlamat utama penubuhan organisasi.

Visi dan misi dijadikan panduan dalam pengurusan organisasi dalam membuat keputusan dan tindakan merembentuk program pengajian terutamanya disamping keperluan lain.

4.3 Educational Goal

Falsafah Pendidikan Kebangsaan (FPK) 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.

Selaras dengan FPK, matlamat pendidikan JPPKK dibangunkan dengan melibatkan ketiga-tiga domain pembelajaran iaitu domain kognitif, psikomotor dan afektif.

4.4 Programme Aim

Matlamat Program adalah satu pernyataan jangkaan pencapaian graduan dalam kerjaya dan kehidupan profesional mereka selepas mereka tamat pengajian. Ini termasuk pencapaian dalam bidang pengetahuan, kemahiran teknikal, kemahiran berkomunikasi, sikap dan juga menyesuaikan diri dengan teknologi terkini.

Mengikut *Code of Practice for Programme Accreditation (COPPA)* second Edition, April 2018, Matlamat Program adalah pernyataan yang menyeluruh yang mengandungi falsafah, tujuan, dan rasional bagi sesebuah penawaran program.

Falsafah merujuk kepada prinsip serta idealism politeknik bagi memenuhi keperluan pendidikan pelanggan bagi melahirkan pelajar yang mempunyai kebolehan dan kecenderungan dalam bidang TVET. Oleh itu, falsafah pendidikan politeknik adalah lebih menitikberatkan tentang potensi individu berbanding dengan kecemerlangan akademik dan ianya selari dengan Falsafah Pendidikan Kebangsaan (FPK).

Tujuan lebih menjurus kepada penetapan atribut pelajar yang merangkumi SATU atribut teknikal dan SATU atribut generik dalam profesion graduan selari dengan FPK atau PPPM (PT) yang menitikberatkan tentang graduan yang seimbang. Rasionalnya pula adalah pernyataan yang mempunyai justifikasi yang menyokong kepada agenda negara.

4.5 Programme Educational Objective (PEO)

PEO adalah pernyataan meluas yang menerangkan pencapaian graduan dalam sesuatu program yang perlu dicapai beberapa tahun setelah tamat pengajian. Sebagai sebuah institusi yang di akreditasi oleh ETAC, maka PEO sesuatu program di bawah kawalan JPPKK diukur 3 - 5 tahun selepas pelajar bergraduasi. PEO yang dibangunkan adalah menyokong kepada Misi dan Visi JPPKK.

PEO Versi 2019 merupakan PEO versi 2014 yang diperhalusi, Pembolehubah untuk pengukuran pencapaian PEO versi 2019 dan versi 2014 tetap sama. Ini adalah rentetan daripada maklum balas pemegang taruh dan data kajian rintis alumni menunjukkan bahawa PEO 2014 adalah masih relevan dan PLO, CLO serta kandungan kursus yang berasal daripada PEO 2014 yang diajarkan dengan keperluan kurikulum yang terkini. Walau begitu, terdapat maklum balas daripada panel luar (*External Examiner*), panel ETAC, ahli akademik dan input dari kursus OBE yang dihadiri oleh jawatankuasa penggubal kurikulum menunjukkan pernyataan PEO 2014 tidak mewakili objektif program kecuali versi PEO yang diringkaskan. Dengan itu, PEO versi 2019 disemak, diperhalusi, disusun semula dan pernyataan diubah supaya lebih jelas serta boleh diukur.

4.6 Programme Learning Outcome (PLO)

Merujuk kepada manual ETAC terkini, pernyataan PLO adalah menggambarkan apa yang sepatutnya pelajar tahu dan dapat dilakukan atau dicapai semasa tamat pengajian mereka. Manakala di dalam manual COPPA Edisi kedua (2017) – dikemaskini Nov 2018, pernyataan PLO menggambarkan pengetahuan, kemahiran, sikap dan kebolehan yang boleh ditunjukkan oleh para graduan apabila tamat pengajian.

PLO perlu dirangka sejajar dengan PEO. PLO yang dirangka, dinyatakan secara jelas dan spesifik. PLO semua program JKE adalah di adaptasi daripada *Programme Outcome* (PO) ETAC. Setiap pernyataan PLO adalah dijelaskan atau ditakrifkan lebih mendalam melalui *Well – Defined Problem Solving*, *Well – Defined Engineering Activities* dan *Knowledge Profile*.

Bagi program diploma dalam bidang kejuruteraan elektrik, 12 PLO telah dibangunkan bagi memenuhi keperluan akreditasi *Engineering Technology Accreditation Council* (ETAC). Pernyataan PLO dinyatakan dalam dokumen kurikulum (*Programme Information*), edaran terhad melalui sistem CiDOS. Manakala, analisis pencapaian PLO adalah bergantung kepada indeks prestasi utama (*Key Performance Indicators*, KPI) yang telah ditetapkan dalam program yang direka bentuk. Lazimnya pencapaian PLO terhadap graduan bagi sesuatu program dinilai atau diukur sebaik sahaja pelajar bergraduasi. Setiap PLO ETAC dipetakan kepada Kluster MQF bagi memenuhi keperluan agenda pendidikan negara.

Jadual 4.1: Pemetaan antara PLO ke Outcome Program ETAC, Kluster MQF dan Domain Taksonomi.

	PLO	ETAC PO	MQF Cluster	Taxonomy
PLO1	<i>Knowledge</i>	PO1	CLS1	Kognitif
PLO2	<i>Problem analysis</i>	PO2	CLS2	
PLO3	<i>Design/ Development of Solution</i>	PO3	CLS2	
PLO4	<i>Investigation</i>	PO4	CLS2	
PLO5	<i>Modern Tool Usage</i>	PO5	CLS3a/CLS3c	Psikomotor
PLO6	<i>The Engineer and Society</i>	PO6	CLS3b	Afektif
PLO7	<i>Environment and Sustainability</i>	PO7	CLS5	

	PLO	ETAC PO	MQF Cluster	Taxonomy
PLO8	<i>Ethics</i>	PO8	CLS5	
PLO9	<i>Individual and Team Work</i>	PO9	CLS3d	
PLO10	<i>Communications</i>	PO10	CLS3b	
PLO11	<i>Project Management and Finance</i>	PO11	CLS4	
PLO12	<i>Life Long Learning</i>	PO12	CLS4	

Kluster Hasil Pembelajaran MQF:

CLS1: Knowledge & Understanding

CLS2: Cognitive Skills

CLS3a: Practical Skills

CLS3b: Interpersonal & Communication Skills

CLS3c: Digital & Numeracy Skills

CLS3d: Leadership, Autonomy & Responsibility

CLS4: Personal & Entrepreneurial Skills

CLS5: Ethics & Professionalism

4.7 Course Learning Outcome (CLO)

Hasil pembelajaran kursus atau *Course Learning Outcomes* (CLO) bagi setiap kursus adalah mempunyai perkaitan dengan PLO yang disediakan. Pernyataan CLO perlu jelas dari aspek kognitif, psikomotor dan afektif yang perlu dicapai oleh para pelajar di akhir kursus. Secara umumnya, bilangan CLO ditetapkan berdasarkan bilangan PLO yang dipetakan bagi sesuatu kursus antara tiga hingga lima bagi setiap kursus.

Secara umumnya, pernyataan CLO bagi setiap kursus mengandungi perkara - perkara berikut:

- CLO mempunyai unsur Kata Kerja (*Verb*), Syarat (*Condition*) dan Standard (*V, C, S*);
- CLO mestilah dapat diukur dan dicapai serta bersesuaian dengan topik - topik yang terkandung dalam kursus yang diajar;
- Nyatakan keupayaan khusus (*competencies*) yang akan ditunjukkan oleh pelajar di akhir kursus seperti penguasaan pengetahuan, kemahiran praktikal, pemikiran kritikal serta penyelesaian masalah, kemahiran kepimpinan dan lain-lain.

Setiap pernyataan CLO mestilah boleh diukur dan dinyatakan dengan jelas serta mengandungi elemen – elemen SMART iaitu:

- a. spesifik (*specific*),
- b. boleh diukur (*measurable*),
- c. boleh dicapai (*achievable*),
- d. realistik (*realistic*),
- e. mempunyai tempoh masa (*time frame*).

4.8 Spesifikasi program

Spesifikasi bagi peringkat program Diploma dan Ijazah Sarjana Muda dipaparkan dalam **Jadual 4.2** Spesifikasi program merupakan satu dokumen yang mengandungi penerangan lengkap mengenai maklumat program yang diperlukan sepanjang pengajian pelajar di politeknik. Spesifikasi ini dilaksanakan sebagai garis panduan pengajaran dan pembelajaran bagi membantu pensyarah mentafsir dan melaksanakan kursus. Kandungan spesifikasi program mengandungi maklumat seperti Jumlah Semester, Jumlah Kredit, Kredit Per semester, Latihan Industri, Kursus Wajib, Kursus Teras Umum, Kursus Teras Disiplin, Kursus Pengkhususan, Kursus Elektif, Peratusan Praktikal dan Maksimum Bilangan Semester serta Maksimum Minggu Pengajian. Spesifikasi ini adalah merujuk kepada *Engineering Technology Programme Accreditation Accreditation Standard 2020* bagi peringkat ijazah sarjana muda dan *Engineering Technician Education Programme Accreditation Standard 2020* bagi peringkat diploma.

Jadual 4.2: Spesifikasi Program Diploma Kejuruteraan dan Program Ijazah Sarjana Muda teknologi kejuruteraan di Politeknik

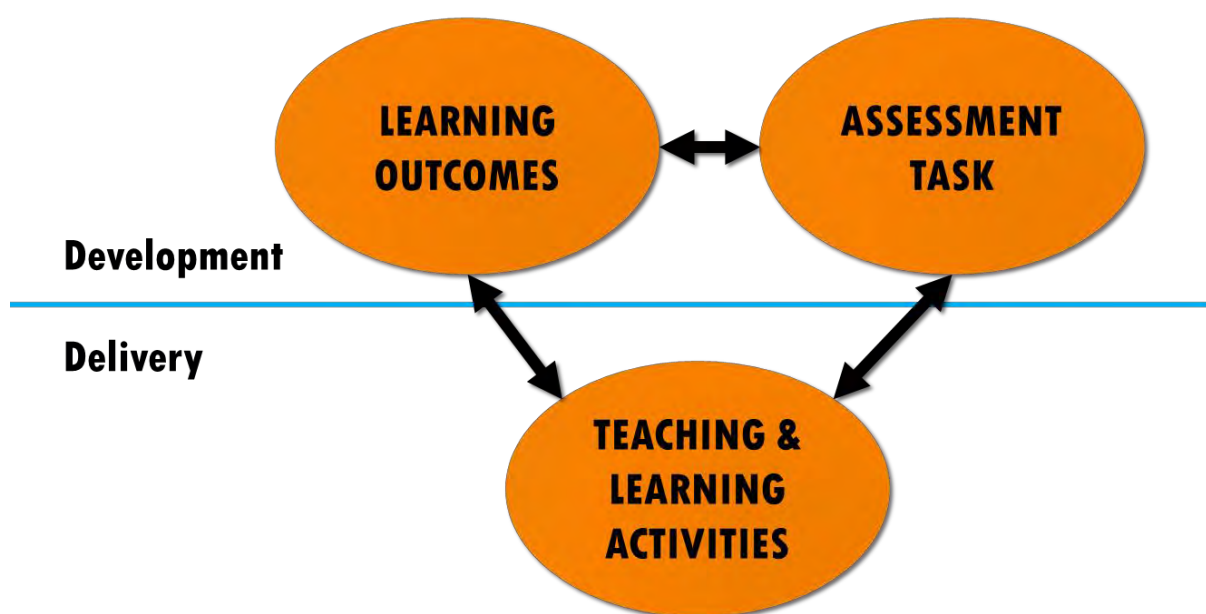
PERKARA	SPESIFIKASI	
	DIPLOMA	SARJANA MUDA (WORK BASED LEARNING)
Jumlah Semester	Minimum 2.5 tahun	Minimum 4 tahun
Jumlah Kredit	Minimum 90 kredit	Minimum 140 kredit
Kredit Per Semester	15-18 kredit	16-20 kredit
Jam Pertemuan Seminggu	Tidak dinyatakan	Tidak dinyatakan
Latihan Industri	Minimum 16 minggu dan maksima 1 tahun	Minimum 24 minggu dan maksimum 1 tahun
Kursus Wajib	Baki kredit setelah ditolak daripada Keperluan jumlah kredit teras disiplin Contoh: Jumlah SLT credit Programme 90 Jumlah SLT Credit Teras Disiplin 70 Jumlah SLT Credit Teras Wajib & Umum 20	Baki kredit setelah ditolak daripada Keperluan jumlah kredit teras disiplin Contoh: Jumlah SLT credit Programme 140 Jumlah SLT Credit Teras Disiplin 120 Jumlah SLT Credit Teras Wajib & Umum 20
Kursus Teras Umum		
Kursus Teras Disiplin	Minimum 60 kredit adalah kursus kejuruteraan atau kejuruteraan teknologi kejuruteraan.	Minimum 100 kredit adalah kursus kejuruteraan atau kejuruteraan teknologi
Kursus Pengkhususan	25% - 30% daripada jumlah kredit kursus teras disiplin	25% - 30% daripada jumlah kredit kursus teras disiplin
Projek Akhir	4 – 6 Kredit	8 – 12 Kredit
Kursus Elektif	Tidak dinyatakan	Tidak dinyatakan
Komponen Praktikal	Minimum 30 kredit komponen praktikal	Minimum 50 kredit komponen praktikal dalam dalam teras disiplin dan pengkhususan
Maksimum bilangan semester & maksimum minggu pengajian	Tidak dinyatakan	2 semester panjang / setahun 1 semester pendek / setahun
	Tidak dinyatakan	Maksimum bil minggu: 43 minggu/tahun

BAB 5: PENJAJARAN KONSTRUKTIF

5.0 Penjajaran Konstruktif

Penjajaran Konstruktif ialah suatu pendekatan mereka bentuk kurikulum, di mana aktiviti pengajaran serta pembelajaran dilakukan untuk memaksimumkan pembelajaran dengan cara penglibatan menyeluruh para pelajar serta dapat mencapai dan melaksanakan apa yang dinyatakan dalam hasil pembelajaran sewaktu aktiviti PdP berlangsung. Disamping itu juga, dapat menilai atau membuat pentaksiran dalam pembelajaran tersebut. Dalam erti kata lain, Penjajaran Konstruktif merujuk kepada kesesuaian antara penilaian, strategi pengajaran dan hasil pembelajaran yang dimaksudkan dalam sesuatu program pengajian (Biggs' Model).

Hasil pembelajaran kursus hendaklah sejajar dengan hasil pembelajaran program, kaedah pengajaran dan pentaksiran.



Rajah 5.1: Penjajaran Konstruktif

BAB 6: TAKSONOMI

6.0 Taksonomi

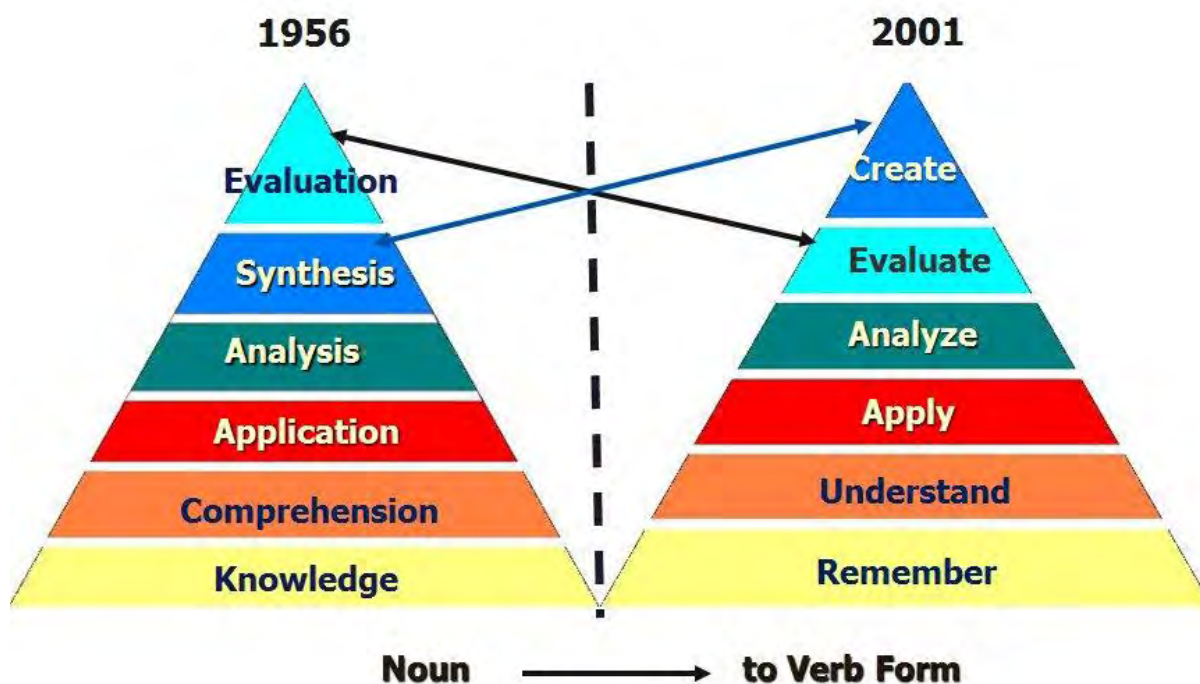
Merujuk kepada kamus dewan Edisi Keempat taksonomi didefinisikan sebagai kajian tentang prinsip, peraturan, dan amalan dalam pengelasan organisma hidup berdasarkan persamaan dan perbezaan sifat organisma itu.

Dalam pembangunan kandungan kursus, terdapat tiga (3) domain pembelajaran yang terlibat iaitu, Domain Kognitif, Domain Psikomotor dan Domain Afektif yang bertujuan untuk menganalisa / mengukur tiga domain pembelajaran iaitu:

- a. Domain kognitif – digunakan untuk mengukur kemahiran intelektual atau pengetahuan.
- b. Domain psikomotor – digunakan untuk mengukur kemahiran kemahiran praktikal dan teknikal.
- c. Domain afektif – digunakan untuk mengukur kemahiran insaniah.

Setiap kursus bagi sesuatu program yang dibangunkan perlu mengambil kira domain pembelajaran tersebut dalam menghasilkan pernyataan CLO yang seterusnya dipetakan kepada PLO. Secara umumnya CLO dan PLO yang dipetakan adalah meliputi ilmu pengetahuan, kemahiran praktikal berkaitan dengan bidang serta kemahiran insaniah yang merujuk kepada penguasaan terhadap kemahiran yang bersifat bukan akademik dan lebih fokus kepada pembangunan kompetensi diri, personaliti dan kemanusiaan. Keadaan ini melengkapkan lagi matlamat pendidikan melalui pendekatan OBE.

Untuk taksonomi domain kognitif terdapat versi semakan semula iaitu versi Krathwohl/ Revised Taxonomy. Perubahan ini adalah melibatkan enam kategori utama telah diubah daripada kata nama kepada kata kerja. Selain daripada itu, terdapat beberapa kategori disusun semula seperti **Rajah 6.1**.



Rajah 6.1: Perubahan Taksonomi versi Bloom's (1956) kepada versi Krathwohl/ Revised Taxonomy (2001)

Sehubungan dengan itu, terdapat satu jawatankuasa pembangunan taksonomi politeknik Malaysia ditubuhkan untuk menyediakan model taksonomi politeknik Malaysia yang dikenali sebagai Taksonomi Politeknik Malaysia 2016 **Lampiran Taksonomi**. Dalam taksonomi ini terdapat penambahbaikan bagi domain kognitif sahaja iaitu kata kerja yang digunakan sekali sahaja dan tidak berulang serta terdapat penambahan kata kerja daripada model Krathwohl dan bidang IT. Taksonomi bagi domain psikomotor dan domain afektif tiada perubahan dengan menggunakan versi Simpson dan Krathwohl masing-masing. Penggunaan Taksonomi politeknik Malaysia 2016 ini merupakan rujukan utama kurikulum, PdP dan penilaian untuk bidang kejuruteraan elektrik serta digunakan bagi kurikulum Versi 2019 yang diedarkan dalam dua bentuk model iaitu:

- a. Roda Taksonomi (kata kerja) – dkomun terkawal dan statik di **Lampiran Taksonomi**
- b. Aplikasi Taksonomi – dokumen terkawal dan dinamik (boleh didapati edaran melalui Ketua Jabatan Kejuruteraan Elektrik)

BAB 7: DOKUMEN KURIKULUM

7.0 Dokumen Kurikulum

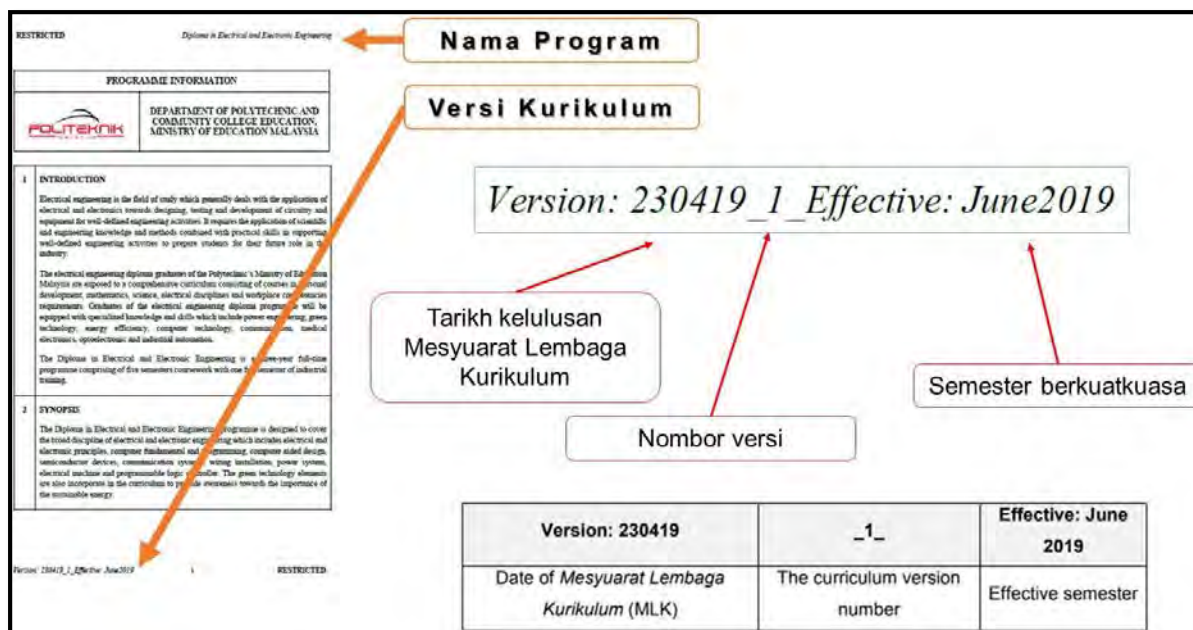
Dokumen Kurikulum diklasifikasikan sebagai **DOKUMEN TERHAD / RESTRICTED** dan pengedaran salinan terkawal dokumen (*hardcopy atau softcopy*) adalah terhad kepada tenaga pengajar politeknik sahaja. Bagi tujuan pengurusan dokumentasi salinan terkawal Dokumen Kurikulum ini adalah mengikut sistem pengurusan kualiti politeknik masing-masing. Manakala edaran salinan terkawal dokumen (*hardcopy atau softcopy*) perlu disahkan oleh pegawai kualiti politeknik. Edaran salinan terkawal dokumen (*hardcopy atau softcopy*) adalah tidak dibenarkan kepada pihak luar.

Dokumen kurikulum terbahagi kepada dua iaitu Maklumat Program / *Programme Information* dan Maklumat Kursus / *Course Information*.

7.1 Maklumat Program / *Programme Information*

Program Information adalah merupakan dokumen yang mengandungi ringkasan program yang mengandungi item-item seperti *Introduction*, *Synopsis*, *Job Prospect*, *Vision*, *Mission*, *Educational Goal*, *Program Aim*, *Programme Educational Objective (PEO)*, *Programme Learning Outcomes (PLO)*, *Matrix of PLO Vs PEO*, dan *Programme Structure*. Setiap pernyataan item ini perlu dirujuk bersama dengan *Programme Information* terkini.

Dokumen *Programme Information* bagi setiap program adalah berbeza dan dapat dikenal pasti melalui nama program di *header* bahagian kanan dokumen. Manakala dibahagian *footer* adalah menunjukkan versi kurikulum yang menerangkan berkaitan dengan tarikh kelulusan Lembaga Kurikulum, nombor versi serta semester berkuatkuasa diringkaskan seperti di **Rajah 7.1**.



Rajah 7.1: Gambarajah ringkas Programme Information

7.1.1 Programme Structure

Struktur program merupakan maklumat ringkas berkaitan program yang mengandungi kursus-kursus yang di tawarkan dalam sesuatu program mengikut semester. Kursus-kursus berikut dipetakan kepada 12 PLO dan 5 kluster seperti dalam **Rajah 7.2**. Setiap satu PLO dipetakan kepada minima 2 kursus.

CLASSIFICATION	COURSE CODE	COURSE NAME	CONTACT HOURS				CREDIT VALUES	PROGRAMME LEARNING OUTCOME (PLO)												PREREQUISITE / CO-REQUISITE
			L	P	T	O		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	
								Knowledge	Problem Analysis	Design/Development of Solutions	Investigation	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Teamwork	Communications	Project Management and Finance	Life Long Learning	
SEMESTER 2																				
Compulsory	MPU21012	Pengajian Malaysia	1	0	2	0	2													
	MPU24XX1	Kelab/Persatuan	0	2	0	0	1													
	MPU24XX1	Unit Beruniform 2																		
Common Core	DBM20023	Engineering Mathematics 2	2	0	2	0	3	√				√					√			
Discipline Core	DET20033	Electrical Circuits	2	2	0	0	3	√				√				√				
	DEE20023	Semiconductor Devices	2	2	0	0	3	√				√					√			
	DEE20033	Digital Electronics	2	2	0	0	3	√				√	√			√				
	DEC20012	Programming Fundamentals	1	2	0	0	2	√				√	√						√	
TOTAL			24				17													

MPU24XX1

DBM10013

DET10013

Kursus pra syara

Rajah 7.2: Contoh Struktur Program yang menunjukkan agihan kursus di Semester 2

Selain itu, dalam struktur program juga terdapat maklumat ringkas berkaitan dengan rekabentuk program seperti dalam **Rajah 7.3**.

	Total Credit	%
i. (a) Compulsory	14	15%
(b) Compulsory (Bahasa Kebangsaan A) ^b	2 ^b	0%
ii. Common Core	13	14%
iii. Discipline Core	54	57%
Total Credit	81	
iv. (a) Electives	4	4%
(b) Free Electives ^a	2 ^a	0%
v. Industrial Training	10	11%
Grand Total Credit	95	100%

Engineering & Engineering Technology Courses	Total Hours	%
i. Lecture	32	42%
ii. Practical	45	58%
iii. Tutorial	0	0%
Total Contact Hours	77	100%

Rajah 7.3: Contoh maklumat ringkas berkaitan dengan rekabentuk program

7.1.1.1 Klasifikasi Kursus

Kursus-kursus yang disenaraikan diklasifikasikan sebagai kursus wajib/*compulsory*, kursus asas/*common core*, kursus teras/*discipline core*, dan pengkhususan/*specialization* dan penerangan klasifikasi di tunjukkan dalam **Jadual 7.1**.

Jadual 7.1: Penerangan klasifikasi kursus

Klasifikasi Kursus	Penerangan
Wajib / Compulsory	Kursus yang ditetapkan oleh KPT dan JPPKK seperti Matapelajaran Umum (MPU), Bahasa, Keusahawan Unit Beruniform dan Persatuan. Contoh: MPU22012 <i>Entrepreneurship</i> , DUE30022 <i>Communicative English 2</i> , MPU21012 <i>Pengajian Malaysia</i>
Teras Umum / Common core	Kursus asas yang mesti diambil oleh pelajar di dalam Jabatan. Contoh: DBM30043 <i>Electrical Engineering Mathematics</i> .
Teras Disiplin / Discipline core	Kursus Teras disiplin yang ditawarkan dalam program pengajian. Contoh: DET10012 <i>Electrical Wiring</i>
Pengkhususan / Specialization	Kursus yang bersesuaian dalam bidang dan ditawarkan pada semester 3, 4 dan 5. Contoh: DEP30013 <i>Communication System Fundamentals</i> bagi program DEP
Elektif / Elective	Kursus Kejuruteraan Elektrik dan Elektronik semester 3 dan ke atas yang tidak ditawarkan dalam program, atau terdiri daripada kursus-kursus semester 1 dan ke atas dari program bukan Kejuruteraan Elektrik dan Elektronik.
Elektif Bebas / Free Elective	Kursus yang tidak terdapat di dalam mana-mana struktur program Elektrik, tetapi sekiranya diambil akan menyumbang kepada HPNM pelajar. Contoh: DUD10012 <i>Design Thinking</i>

7.1.1.2 Istilah Kursus Pra- syarat dan Syarat-bersama

Jadual 7.2: Penerangan mod Pengajaran dan Pembelajaran (P&P)

Pra-syarat/ Pre Requisite	Syarat-bersama /Co-Requisite
Kursus yang diambil dan mesti LULUS sebelum mengambil kursus berikutnya. Contoh: Kursus DET10013 adalah prasyarat kepada kursus DET20033	Kursus yang perlu diambil pada masa yang sama sebagai kursus lain/keperluan lain.

7.1.1.3 Jam pertemuan

Jam pertemuan diagihkan mengikut L (kuliah), P (praktikal), T (tutorial) dan O (lain-lain) yang berkait dengan nilai kredit kursus tersebut.

Jadual 7.3: Penerangan mod Pengajaran dan Pembelajaran (P&P)

Label	Penerangan
L	Kuliah- Kaedah penyampaian teori kepada pelajar untuk mencapai hasil pembelajaran.
P	Praktikal- Pembelajaran yang berorientasikan psychomotor iaitu melibatkan pelajar dengan penggunaan kemudahan, peralatan dan instrumentasi.
T	Tutorial- Kelas bimbingan yang melibatkan sekumpulan kecil pelajar sebagai pelengkap kepada kuliah.
O	Apa-apa kaedah pembelajaran pengalaman aktif yang melibatkan pelajar dalam pembelajaran melalui pengalaman dan memerlukan pelajar membuat refeksi terhadap apa yang telah dipelajari. Melibatkan pengumpulan data antropologi atau sosiologi melalui temuduga dan pemerhatian subjek di lapangan.

7.1.1.4 Bahasa Kebangsaan A

Penawaran kursus adalah untuk menyokong Garis Panduan Matapelajaran Pengajian Umum Edisi Kedua (2017) yang **DIWAJIBKAN** ke atas pelajar yang tidak mendapat kredit/kepujian (Gred C) di dalam Bahasa Melayu peringkat Sijil Pelajaran Malaysia (SPM). Penawaran kursus adalah bermula kohort baharu (semester 1) pada sesi Jun 2019 (merujuk kepada Pekeliling Kurikulum Bil 8 Tahun 2019) bagi program pengajian diploma di Jabatan Kejuruteraan Elektrik, Politeknik Malaysia. Bagi pelajar JKE yang tidak mendapat kredit, Bahasa Kebangsaan A boleh diganti sebagai kursus elektif tanpa perlu menambah jam kredit bergraduasi. (Rujuk **Rajah 7.3 dan Rajah 7.4**).

U2 (2 atau 3 kredit)	U3 (2 atau 3 kredit)	U4 (2 kredit)	Bahasa Pengantar	
Kemahiran Kepimpinan dan Hubungan Insan	Ekonomi Malaysia	Khidmat Masyarakat	Bahasa Melayu	Bahasa Inggeris
Kemahiran Reka cipta dan Inovasi	Kerajaan dan Dasar Awam Malaysia	Ko-kurikulum	✓	✓
Kemahiran Menulis	Perlakuan Organisasi Dalam Masyarakat Pelbagai Etnik Malaysia	Atau lain-lain yang dicadangkan oleh KPT dan IPT	✓	✓
Kemahiran Berfikir	Perbandingan Agama		✓	✓
Kemahiran Keusahawanan	Etika Perbandingan		✓	✓
Atau lain-lain yang dicadangkan oleh KPT dan IPT	Atau lain-lain yang dicadangkan oleh KPT dan IPT		✓	✓
Nota: ❖ Kursus-kursus U2-U4 ditetapkan oleh IPT. ❖ Bagi pelajar warganegara yang tidak mendapat kredit di dalam kursus Bahasa Melayu peringkat Sijil Pelajaran Malaysia (SPM) maka DIWAJIBKAN mengambil kursus Bahasa Kebangsaan A sebagai komponen U2.				

Rajah 7.4: Pelaksanaan Kelompok U2, U3 dan U4 Sumber: Garis Panduan MPU, Edisi Kedua (2017)

7.1.1.5 Kursus Elektif

Kursus yang mesti diambil dengan jumlah minima 4 kredit mengikut keperluan Standard MQA dan ETAC dan mesti memenuhi syarat-syarat berikut:

- Kursus Elektif dibenarkan merentas bidang.
- Mana-mana kursus yang tidak ada dalam struktur program boleh ditawarkan sebagai kursus elektif
- Perlu patuh kepada pra syarat kursus
- Sekiranya kursus yang ditawarkan **BUKAN** bidang Kejuruteraan politeknik perlu memaklumkan kepada UKE, JPPKK untuk menentukan mapping PLO ETAC

7.1.1.6 Kursus Free Elective^a

Kaedah pelaksanaan adalah tertakluk kepada institusi iaitu samada dijalankan semasa semester pendek atau secara kursus berkelompok

(dilaksanakan di luar waktu Pengajaran dan Pembelajaran atau pada hari cuti mingguan/cuti semester). Pelaksanaan kursus ini adalah berpandukan kepada garis panduan yang dibangunkan oleh JPPKK iaitu *Free Elective Guideline: Design Thinking* bermula sesi Jun 2019. Mana-mana institusi yang berminat untuk menawarkan *free elective* DT ini perlu memaklumkan kepada UKE, JPPKK untuk menentukan mapping PLO ETAC. (Rujuk **Rajah 7.3**).

7.1.1.7 Latihan Industri

Latihan Industri adalah satu syarat wajib bagi pelajar dan mesti LULUS bagi membolehkan pelajar bergraduasi. Latihan industri ini dilaksanakan pada semester akhir dan membawa nilai kredit 10 jam. Kod baru Latihan Industri DUT600610 Engineering Industrial Training hanya akan berkuatkuasa pada sesi Jun 2020. (Rujuk **Rajah 7.3**).

7.1.1.8 Komponen praktikal

Standard ETAC mewajibkan pelaksanaan 50% komponen praktikal dalam kurikulum. Pengiraan komponen Praktikal adalah mengambil kira nisbah Contact Hours Practical kepada jumlah Contact Hours kursus Discipline Core dan Specialisation. (Rujuk **Rajah 7.3**).

7.1.2 Kursus MPU U4 Kokurikulum Berkredit dan Tidak Berkredit

Pelaksanaan kursus kokurikulum berkredit bagi kedua-dua laluan dilaksanakan pada Semester 1 dan Semester 2 menggunakan kod baharu MPU24XX1. Manakala kursus kokurikulum tidak berkredit MPU24XX0 Unit Beruniform 3 dan MPU24XX0 Unit Beruniform 4 ditawarkan kepada pelajar sebagai pilihan bagi tujuan penganugerahan dan pentauliahannya daripada badan unit beruniform berkenaan. Proses pembelajaran dan pengajaran kursus Unit Beruniform tidak berkredit ini perlu diambil kira jam mengajar dan dinyatakan dalam jadual waktu bagi pensyarah yang terlibat. Pelaksanaan kursus MPU U4 kokurikulum berkredit dan kokurikulum tidak berkredit adalah diselenggarakan pada setiap hari Rabu selari dengan pelaksanaan aktiviti kokurikulum di sekolah rendah dan menengah yang ditetapkan oleh Kementerian Pendidikan Malaysia.

Jadual 7.4: Kelompok MPU (Sumber: Garis Panduan MPU, Edisi Kedua (2017))

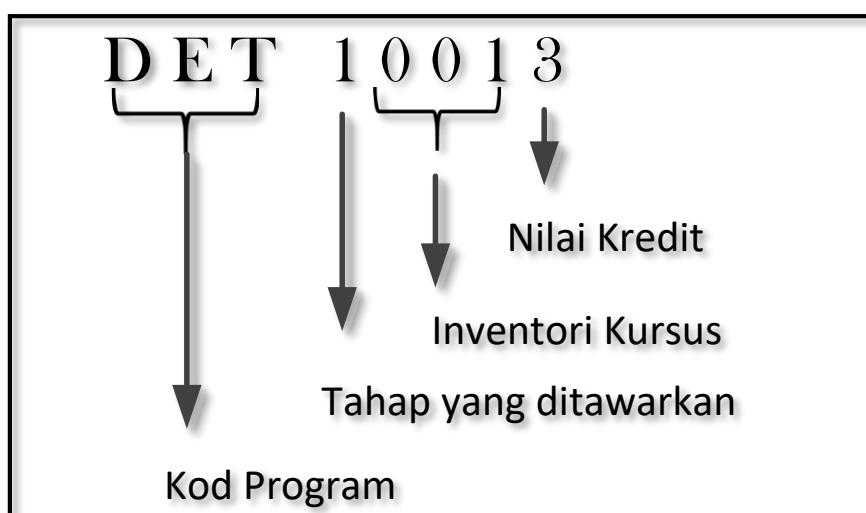
TAHUN	PERTAMA		KEDUA		KETIGA	
SEMESTER	1	2	3	4	5	6
LALUAN 1	MPU24011 Sukan (1 Kredit)	MPU24021 Kelab/ persatuan (1 Kredit)				Latihan industri
LALUAN 2	MPU24XX1 Unit Beruniform 1 (1 Kredit)	MPU24XX1 Unit Beruniform 2 (1 Kredit)	MPU24XX1 Unit Beruniform 3 (0 Kredit)	MPU24XX1 Unit Beruniform 4 (0 Kredit)		

7.2 Maklumat Kursus / Course Information

Menerangkan maklumat kursus secara terperinci seperti nama dan kod kursus, sinopsis kursus, semester/tahun kursus ditawarkan, CLO, pemetaan antara CLO dan PLO, kaedah pengajaran yang digunakan, pengagihan SLT, buku rujukan, sukatan kursus, jenis penilaian dan peratus penilaian.

7.2.1 Name of Course and Course Code

Nama kursus ditetapkan untuk menyatakan kursus yang ditawarkan dan membezakan di antara satu kursus dengan kursus yang lain. Setiap kod kursus didaftarkan di dalam inventori dengan menggunakan sistem pengkodan kursus politeknik seperti **Rajah 7.5**.

**Rajah 7.5: Sistem pengkod kursus politeknik**

7.2.2 Synopsis

Penerangan kepada silibus kursus secara umum.

7.2.3 Name of Academic Staff

Nama staf akademik (pensyarah) yang mengajar sesuatu kursus

7.2.4 Semester and Year Offered

Semester dan tahun pengajian sesuatu kursus ditawarkan

7.2.5 Credit Value

Setiap kursus diberi nilai kredit berdasarkan standard MQF: 1 kredit bersamaan 40 jam pembelajaran. Nilai Kredit memberi panduan sejauh mana beban kerja pelajar dalam kursus yang berkenaan.

7.2.6 Pre-requisite

Syarat yg mesti dipenuhi sebelum membolehkan sesuatu kursus seterusnya diambil. Kursus yang mempunyai pra-syarat adalah kursus yang hanya boleh diambil setelah LULUS kursus pra-syarat yang ditetapkan

7.2.7 Course Learning Outcome (CLO)

CLO adalah Hasil pembelajaran kursus dimana pelajar mendapat pengetahuan atau dapat melakukan sesuatu di akhir sesuatu aktiviti pembelajaran. Pencapaian dalam CLO secara tidak langsung menyumbang kepada pencapaian PLO. Penyataan CLO meliputi aspek kognitif, afektif dan psikomotor yang perlu dicapai di akhir setiap kursus yang diambil oleh para pelajar. Secara umumnya:

- a. Jumlah bilangan CLO bagi setiap kursus adalah bergantung kepada jumlah jam kredit kursus tersebut.
- b. PLO yang diagihkan kepada kursus boleh dikenalpasti daripada pemetaan Courses vs. PLO bagi program masing-masing.

- c. CLO mestilah berhubungkait dengan PLO yang telah diagihkan kepada kursus.
- d. Setiap PLO perlu ada CLO yang mencapainya.
- e. Minimum satu (1) CLO menyokong satu (1) PLO.
- f. Satu PLO boleh dicakupi oleh lebih dari satu (1) CLO
- g. Walau bagaimanapun bagi kursus yang tidak mempunyai PLO psikomotor (PLO5) tetapi mempunyai PLO kognitif (PLO1-PLO4) dan PLO afektif (PLO6 - PLO12), haruslah mempunyai minimum satu (1) CLO tentang kognitif (knowledge) dan satu (1) CLO tentang afektif (generic skills).

Ayat CLO sesuatu kursus adalah merujuk kepada PLO yang telah diagihkan kepada kursus tersebut. **Jadual 2** menunjukkan contoh CLO sesuatu kursus berdasarkan PLO yang telah diberi. CLO mestilah mempunyai elemen Kata kerja (Verb), Syarat (Condition) dan Piawai (Standard).

Jadual 7.5: Contoh Pembinaan CLO berdasarkan PLO.

PLO (KNOWLEDGE)	AYAT CLO
PLO1 – Application	CLO# - Apply the concept and principal of optical physics to solve the optical problems by using different methods and approaches.
PLO2 – Problem Analysis	CLO# - Evaluate optoelectronic components based on semiconductor physics theory (C5, PLO2).
PLO3 – Design	CLO# - Design embedded system application based on PIC16F/ PIC18F microcontroller effectively (C6, PLO3).
PLO4 – Investigation	CLO# - Investigate requirements of LED design based on electrical and optical properties by applying theory of semiconductor and recombination process (C4, PLO4).

Kata kerja CLO adalah selari dengan kata kerja di dalam PLO. Kata Kerja setiap CLO akan menjadi penanda aras kognitif/ psikomotor/ afektif paling tinggi dalam pentaksiran.

Nota:

**Well-defined engineering concept/ situation/ solution/ problem ialah skop pembelajaran bagi peringkat diploma (juruteknik) mengikut Dublin Accord.*

Jadual 7.6: Contoh CLO bagi kursus DEO30013 – Optical Fundamentals.

PLO	AYAT CLO
PLO1 – Application	Apply the concept and principal of optical physics to solve the optical problems by using different methods and approaches. (C3, PLO1)
PLO5 – Practical skill	Measure the optical properties by using appropriate optical tools correctly. (P4, PLO5)
PLO3 – Communication skill	Demonstrate good communication skill in oral presentation in group, on assigned topics within a stipulated time frame. (A3, PLO10)

Nota

**C3 adalah aras kognitif paling tinggi, P4 ialah aras psikomotor dominan, A3 adalah aras afektif yang dominan.*

Penyataan CLO boleh merujuk kepada 10 Bidang Tumpuan yang dinyatakan dalam BLUEPRINT POLYGreen atau teknologi hijau oleh Kettha yang merangkumi perkara berikut:

- Pembangunan dan aplikasi produk, peralatan serta sistem untuk memelihara alam sekitar dan alam semulajadi;
- Meminimumkan atau mengurangkan kesan negatif daripada aktiviti manusia;
- Mengurangkan degradasi kualiti persekitaran;
- Rendah atau sifar pembebasan gas rumah hijau;
- Jimat tenaga dan sumber asli;
- Menggunakan sumber tenaga boleh baharu serta selamat pada alam sekitar

Jadual 7.7: Contoh CLO bagi kursus DET30053 – Power System

PLO	AYAT CLO
PLO1 – Application	Apply the concepts of eco-friendly electrical power generation resources, to improve an environmentally conscious of a quality power generation, transmission and distribution system and its efficiency . (C3, PLO1)
PLO5 – Practical skill	Perform the practical works on electrical power generation, transmission and distribution system using an appropriate energy efficient equipment (P4, PLO5)
PLO7 –	Demonstrate the awareness toward the sustainable energy generation and environmental friendly methods of transmission and distribution system (A3, PLO7)

7.2.8 Pemetaan Hasil Pembelajaran Kursus Melawan Hasil Pembelajaran Program, Kaedah Pengajaran dan Pentaksiran

Pemetaan ini dihasilkan bagi membolehkan pensyarah melakukan penjajaran konstruktif (*constructive alignment*) di antara CLO dengan PLO, kaedah pengajaran dan kaedah pentaksiran dengan lebih berkesan dan memenuhi kehendak hasil pembelajaran kursus dan program.

Melalui penjajaran konstruktif, pensyarah boleh merancang dan mempelbagaikan aktiviti pengajaran dan pembelajaran serta penilaian yang secara langsung diarahkan untuk mencapai hasil yang ditetapkan pada peringkat kursus dan seterusnya peringkat program.

		Programme Learning Outcomes (PLO)												Teaching Methods	Assessment Methods
	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
CLO1	Apply the concept and principles of the related electrical circuit theorems and law to solve DC electrical circuit using various method and approach (C3 , PLO 1)	/												Interactive Lecture	Test
															Quiz
															EOC
														Discussion	Final Assessment
CLO2	Construct DC circuit and measure related electrical parameters using appropriate electrical equipments (P4 , PLO 5)													Laboratory Activity	Practical Work
															Practical Test
CLO3	Demonstrate ability to work in team to complete assigned tasks within the stipulated time frame (A3 , PLO 9)													Laboratory Activity	Practical Work

Rajah 7.5: Pemetaan Hasil Pembelajaran Kursus Melawan Hasil Pembelajaran Program (*Mapping of CLO to PLO, Teaching Methods and Assessment*) bagi kursus DET10013 Electrical Technology

Contoh Kursus DET10013 *Electrical Technology*:

- ❖ CLO 1 adalah hasil pembelajaran domain kognitif dengan aras maksima C3 - *Application*, harus menyumbang kepada hasil pembelajaran program (PLO1- *Knowledge*). Kaedah pengajaran adalah dalam bentuk pengkuliah, manakala aktiviti pentaksiran dibuat dalam bentuk soalan kuiz, ujian, *end of chapter*, dan peperiksaan akhir.
- ❖ CLO 2 adalah hasil pembelajaran domain psikomotor dengan aras maksima P4 - *Mechanism* harus menyumbang kepada hasil pembelajaran program (PLO 5- *Modern Tool Usage*). Kaedah pengajaran adalah dalam bentuk aktiviti amali, manakala pentaksiran dibuat melalui sesi amali dan ujian amali.
- ❖ CLO 3 adalah hasil pembelajaran domain afektif dengan aras maksima A3 - *Valuing* harus menyumbang kepada hasil pembelajaran program (PLO 9- *Individual and Team Work*). Kaedah pengajaran digabungkan dengan aktiviti amali, dan pentaksiran dibuat semasa waktu amali.

7.2.9 *Transferable Skill*

Ia merupakan kemahiran (*skills*) dan kebolehan (*abilities*) yang merangkumi 3 domain pembelajaran iaitu kognitif, psikomotor dan efektif yang perlu dicapai di akhir pembelajaran sesuatu kursus.

7.2.10 Student Learning Time (SLT)

Jam Pembelajaran Pelajar (JPP) / *Student Learning Time (SLT)* merupakan masa pembelajaran berkesan atau usaha pelajar atau jumlah masa pelaksanaan keseluruhan aktiviti pembelajaran yang digunakan untuk mencapai hasil pembelajaran yang ditetapkan dalam sesuatu kursus. Ini merangkumi masa pelaksanaan semua aktiviti pembelajaran iaitu pembelajaran formal dan tidak formal seperti kuliah, tutorial, seminar, praktikal, pembelajaran sendiri, pencarian maklumat, penyelidikan, kerja lapangan dan juga persediaan penilaian.

Secara ringkasnya, SLT adalah jumlah masa yang diperlukan untuk mempelajari sesuatu kursus yang terdiri daripada Jam Pembelajaran Berpandu, Jam Pembelajaran Kendiri dan Jam Penilaian Formal.

a. Jam Pembelajaran Berpandu/ *Dependent Learning*

Pembelajaran Berpandu boleh dijalankan secara bersemuka (*face to face, F2F*) atau secara tidak bersemuka (*non-face to face, NF2F*).

- i. Pembelajaran F2F dan berpandu (*guided*) merangkumi aktiviti pembelajaran seperti kuliah, amali, tutorial, kerja makmal, kerja lapangan serta aktiviti pengajaran dan pembelajaran (PdP) dalam kelas.
- ii. Manakala, pembelajaran NF2F dan berpandu (*guided*) adalah aktiviti PdP di dalam atau di luar kelas termasuk aktiviti pembelajaran teradun (*blended learning*). Komponen *Blended Learning* adalah seperti:
 - ❖ Objek Pembelajaran /*Learning Object (LO)* secara *online* yang dibangunkan melalui teknologi *Sharable Content Object Reference Model (SCORM)* dan boleh dicapai oleh pelajar melalui *Learning Management System (LMS)* di CIDOS.
 - ❖ e-Nota /*e-Notes* iaitu nota yang telah dimuat naik ke LMS dan boleh dimuat turun ke peranti capaian komersial.
 - ❖ *e-Collaborative Classroom* iaitu aktiviti perbincangan yang boleh dilaksanakan samada secara *online* (aplikasi Web 2.0) atau secara bersemuka dengan menggunakan pendekatan pedagogi *Flipped Classroom*.

b. Jam Pembelajaran Kendiri/ *Independent Learning*

Jam Pembelajaran Kendiri adalah masa/jam tambahan secara NF2F yang diperuntukkan kepada pelajar untuk membuat persediaan ke kuliah, amali, tutorial, projek, dan semua pentaksiran. Ini termasuk *Complementary e-Contents* yang digunakan dalam *blended learning* untuk pengukuhan pembelajaran.

c. Jam Penilaian Formal/ *Formal Assessment*

Jam Penilaian Formal adalah masa yang diperuntukan untuk pelaksanaan penilaian berterusan dan peperiksaan akhir samada berbentuk F2F (Kuiz, Ujian, Ujian Amali, pembentangan, peperiksaan akhir) atau NF2F (*End of Chapter, Essay Question, Case Study, Online Quiz*).

Selain itu, SLT juga digunakan untuk menentukan jumlah jam kredit sesuatu kursus. **SATU (1) jam kredit** adalah bersamaan dengan **40 JAM** pembelajaran nosional atau SLT. Sistem kredit ini memastikan beban pembelajaran pelajar diagihkan secara sama rata dalam sesuatu kalendar akademik.

Tempoh pelaksanaan minggu pembelajaran program peringkat diploma dan sijil telah dipinda daripada 16 minggu kepada 14 minggu sejajar dengan langkah penambahbaikan Kalendar Akademik Politeknik yang mengambil kira pematuhan kepada keputusan Mesyuarat Kajian Semula Dasar-Dasar Berkaitan Jaminan Kualiti KPM-MQA Bil. 1/2011 berkaitan pelaksanaan sistem semester dan tempoh semester pendek.

Berikut adalah penetapan pekali jam untuk Pembelajaran Kendiri (*Independent Learning*) berdasarkan Laporan Bengkel Pembinaan Silibus, AST dan SLT di Nexus Regency Suites & Hotel pada 28 - 30 Oktober 2018.

Jadual 7.8: Penetapan Pekali Jam untuk Pembelajaran Kendiri

Bil	Aktiviti PdP dan Pentaksiran	Pekali Jam
1.	Lecture (L)	1
2.	Practical Work (P)	0.5
3.	Tutorial (T)	1
4.	Quiz	1 atau 2
5.	Theory Test	2
6.	Practical Test	0.5
7.	Presentation	1
8.	Final Examination (FA)	
	i. 2 jam kredit	2
	ii. 3 jam kredit	3

Prinsip menetapkan dan mengira Sistem Kredit yang merujuk kepada MQA adalah mengikut contoh nilai beban **SATU (1) jam kredit** di bawah.

Nilai beban bagi **SATU (1) jam kredit** yang bersamaan dengan **40 JAM** pembelajaran nosional atau SLT setara selama satu semester pengajian (14 minggu) boleh terdiri daripada:

- a. **Satu (1) jam** pertemuan rasmi secara kuliah (perkuliahan berjadual) setiap minggu dalam tempoh 14 minggu belajar (satu semester pengajian); **DAN/ATAU**
- b. **Dua (2) tiga (3) jam** menghadiri aktiviti pembelajaran berjadual (pembelajaran berpandu/ *guided learning*) seperti;
 - i. seminar
 - ii. tutorial
 - iii. kerja makmal
 - iv. kerja lapangan/padang
 - v. kerja studio
 - vi. menyiapkan projek

untuk setiap minggu dalam tempoh 14 minggu belajar (satu semester pengajian)

Pelajar diselia atau pembelajaran mereka dipandu semasa menyiapkan tugas dalam tempoh yang dijadualkan itu; **DAN/ATAU**

- c. Setiap **Dua (2) Minggu** Latihan Industri, dengan syarat tempoh minimum latihan adalah selama 12 minggu berterusan; **DAN/ATAU**

- d. Gabungan sebahagian daripada mana-mana komponen di atas untuk membentuk SLT setara dengan **40 jam nosional** setiap semester untuk menjadikan beban akademik sebesar **satu (1) kredit**.

Rajah 7.6 menunjukkan contoh SLT bagi sebuah kursus yang mempunyai **tiga (3) jam kredit** yang bersamaan **120 jam** pembelajaran nosional setara selama satu semester pengajian.

Berdasarkan **Rajah 7.6**, berikut adalah cara membaca Jadual SLT. Sebagai contoh:

- i. Jam kuliah (F2F) yang diperuntukkan untuk bab 1 adalah selama **6 jam**. Oleh itu, jumlah jam pembelajaran sendiri (NF2F) bagi bab tersebut adalah sebanyak 6 jam x 1 jam pekali = **6 jam**. Maka, jumlah jam SLT bagi bab tersebut adalah **12 jam** (jam F2F + jam NF2F).
- ii. Pelaksanaan **2 jam** amali (F2F) telah ditetapkan bagi topik bab 2. Maka, jumlah jam yang diperlukan untuk persediaan (NF2F) sebelum menjalankan aktiviti tersebut adalah sebanyak 2 jam x 0.5 jam pekali = **1 jam**.
- iii. Sebanyak **1 jam** diperlukan untuk melaksanakan 2 kuiz (rujuk AST). Oleh itu, jumlah jam yang diperlukan untuk persediaan (NF2F) bagi 2 kuiz tersebut adalah sebanyak 1 jam x 2 jam pekali = **2 jam**.
- iv. Jumlah SLT bagi kursus ini adalah **120 jam**. Maka, jumlah kredit bagi kursus ini adalah 120 jam / 40 jam = **3 kredit**.
- v. Memandangkan kursus ini mempunyai 3 jam kredit, maka, pembelajaran sendiri (NF2F) bagi peperiksaan akhir adalah sebanyak **2 jam** x 3 jam pekali = **6 jam**.

		Teaching and Learning Activities						
Course Content Outline	CLO*	L	P	T	O	Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	SLT
1.0 NATURE OF LIGHT 1.1 Understand the dual nature of light 1.2 Know Wave Theory as a nature of light 1.3 Understand Wave Theory as a nature of light 1.4 Apply wavelength formula in optical problem 1.5 Know Particle Theory as a nature of light 1.6 Understand Particle Theory as a nature of light 1.7 Apply the formulas in 1.6 to solve a photonic problem 1.8 Know properties of light 1.9 Understand properties of light 1.10 Know spectrum of light 1.11 Know source of light 1.12 Understand source of light 1.13 Apply blackbody radiator equation 1.14 Know Optic, Photonic and Optoelectronic.	CLO1	6	0	0	0	0	6	12
2.0 GEOMETRICAL OPTICS 2.1 Know light rays 2.2 Know reflection of light 2.3 Apply Law of Reflection 2.4 Understand reflection of light on a plane mirror 2.5 Understand reflection of light on a curved mirror 2.6 Apply Ray Diagram technique to obtain the image characteristics of mirror 2.7 Apply curve mirror equations and sign convention table in mirror problems 2.8 Know refraction of light 2.9 Understand refraction of light 2.10 Apply velocity, refractive index, critical angle and Snell's Law equations. 2.11 Understand dispersion of light	CLO1	7	0	0	0	0	7	14
	CLO2	0	2	0	0	0	1	3
3.0 SYSTEM OF LENSES 3.1 Know system of lenses 3.2 Understand system of lenses 3.3 Apply Ray Diagram technique to obtain the image characteristics of lenses 3.4 Apply equations and lens sign convention table in lenses problems 3.5 Understand optical instruments using lens 3.6 Apply magnification equations	CLO1	6	0	0	0	0	6	12
	CLO2	0	1	0	0	0	0.5	1.5
4.0 WAVE OPTICS 4.1 Know light wave 4.2 Know reflection and refraction of light wave 4.3 Understand diffraction of light wave 4.4 Understand interference of light wave 4.5 Apply diffraction and interference formulas 4.6 Understand polarization of light wave	CLO1	5	0	0	0	0	5	10
	CLO2	0	1	0	0	0	0.5	1.5
5.0 OPTICAL ABERRATIONS 5.1 Knows the optical aberrations 5.2 Understand the optical aberrations	CLO1	1.5	0	0	0	0	1.5	3
	CLO3	0.5	0	0	0	0	0.5	1
TOTAL:								58
CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F			NF2F			SLT
QUIZ	5	1			2			3
THEORY TEST	10	1			2			3
PRACTICAL WORK	25	18			9			27
PRACTICAL TEST	5	2			1			3
GENERIC SKILL (END OF CHAPTER)	5	4			4			8
END OF CHAPTER (EOC)	10	0			10			10
TOTAL:								58
FINAL ASSESSMENT	PERCENTAGE (%)	F2F			NF2F			SLT
FINAL EXAM	40	2			6			8
TOTAL:								8
**Please tick (✓) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using 2-weeks, 1 credit formula							GRAND TOTAL SLT: 120	
L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face								
*Indicate the CLO based on the CLO's numbering in Item 8.								

Rajah 7.6: Contoh Jadual SLT

BAB 8: INTERPRETASI KURIKULUM

8.0 Interpretasi Kurikulum

Interpretasi kurikulum dilaksanakan adalah bertujuan untuk memastikan pensyarah – pensyarah politeknik menterjemahkan dokumen kurikulum dengan interpretasi / kefahaman yang sama. Ini adalah untuk penyelarasan diperingkat Jabatan Kejuruteraan Elektrik semua politeknik.

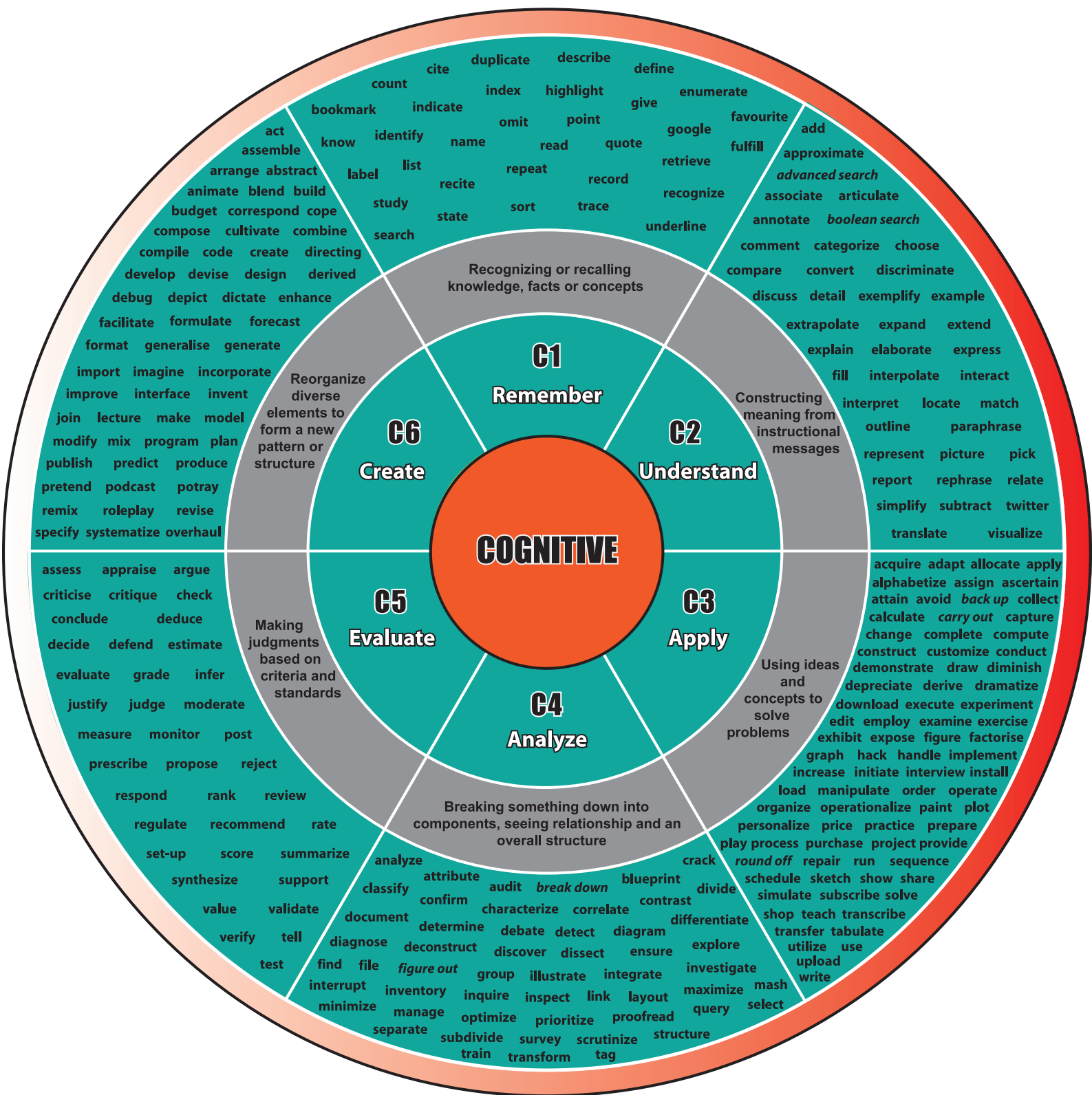
Selain itu, penerangan yang jelas perlu diberikan kepada pensyarah bagi memastikan penggunaan dokumen kurikulum yang betul serta untuk memastikan hasil pembelajaran program dan kursus tercapai.

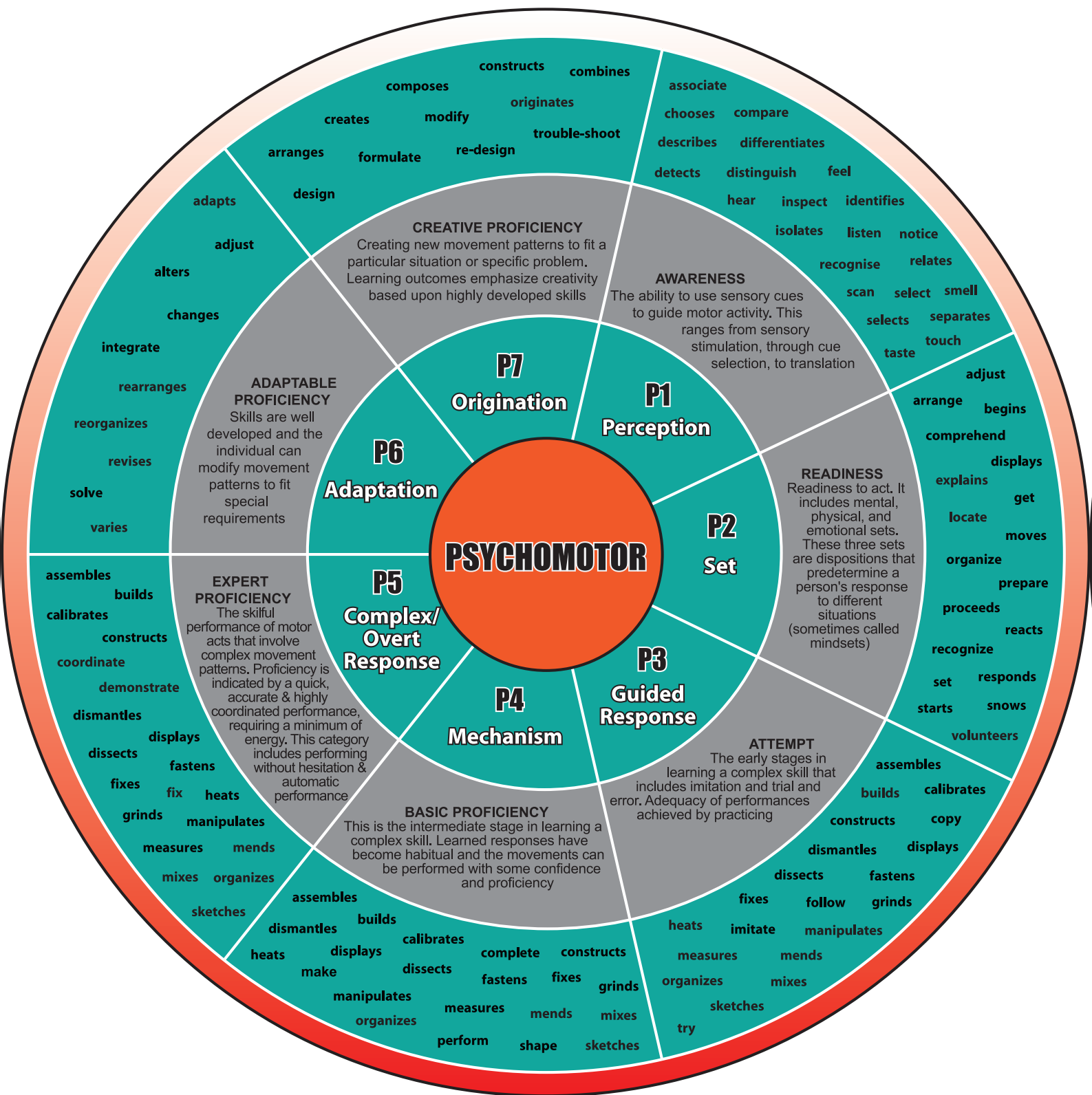
Terdapat dua bahagian yang disampaikan kepada pensyarah iaitu, berkaitan dengan perkara umum tentang asas penambahbaikan kurikulum, dan dokumen kurikulum iaitu *programme information* serta *course information*. Interpretasi ini diringkaskan dalam **Lampiran Pembentangan**.

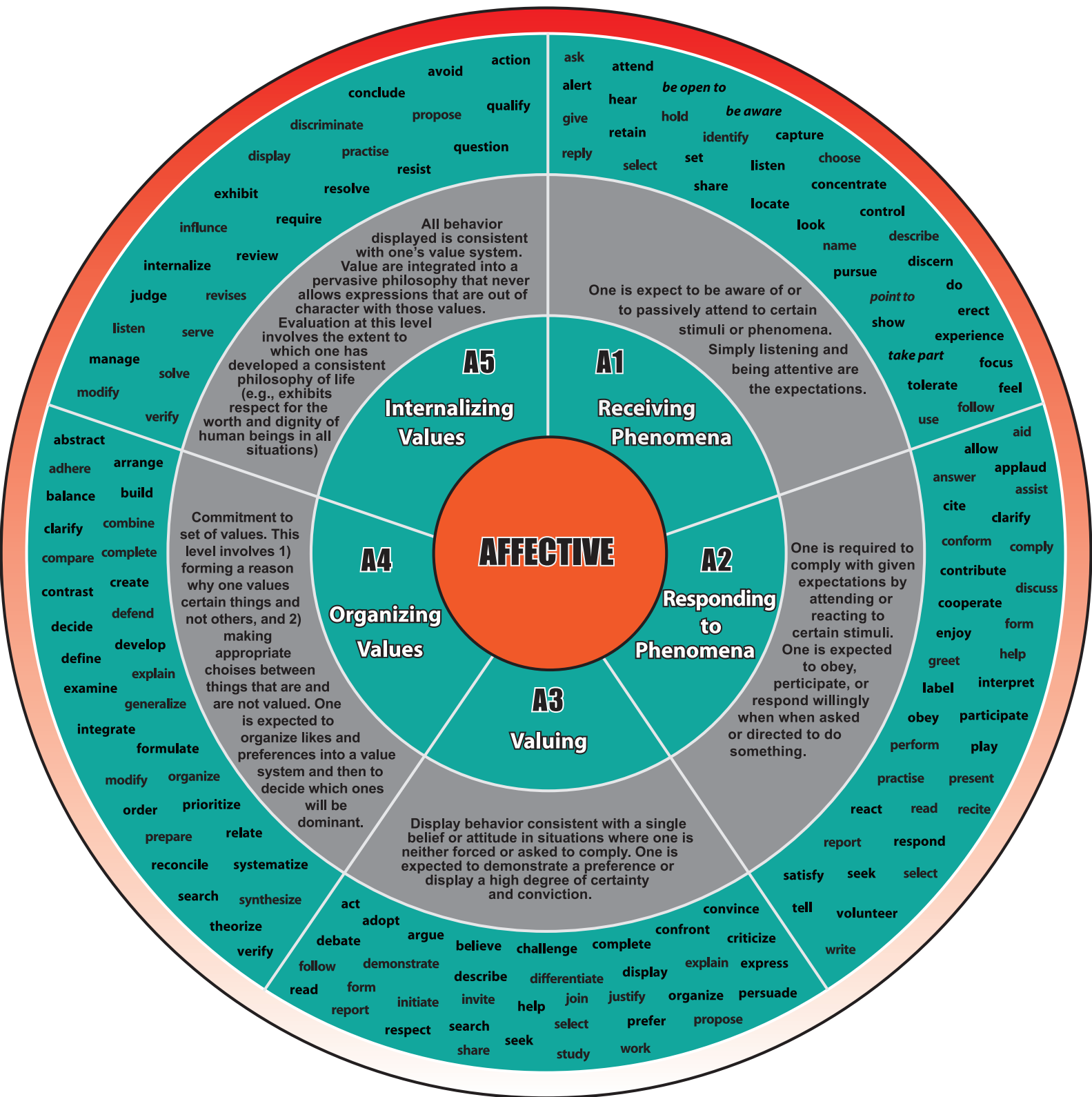
RUJUKAN

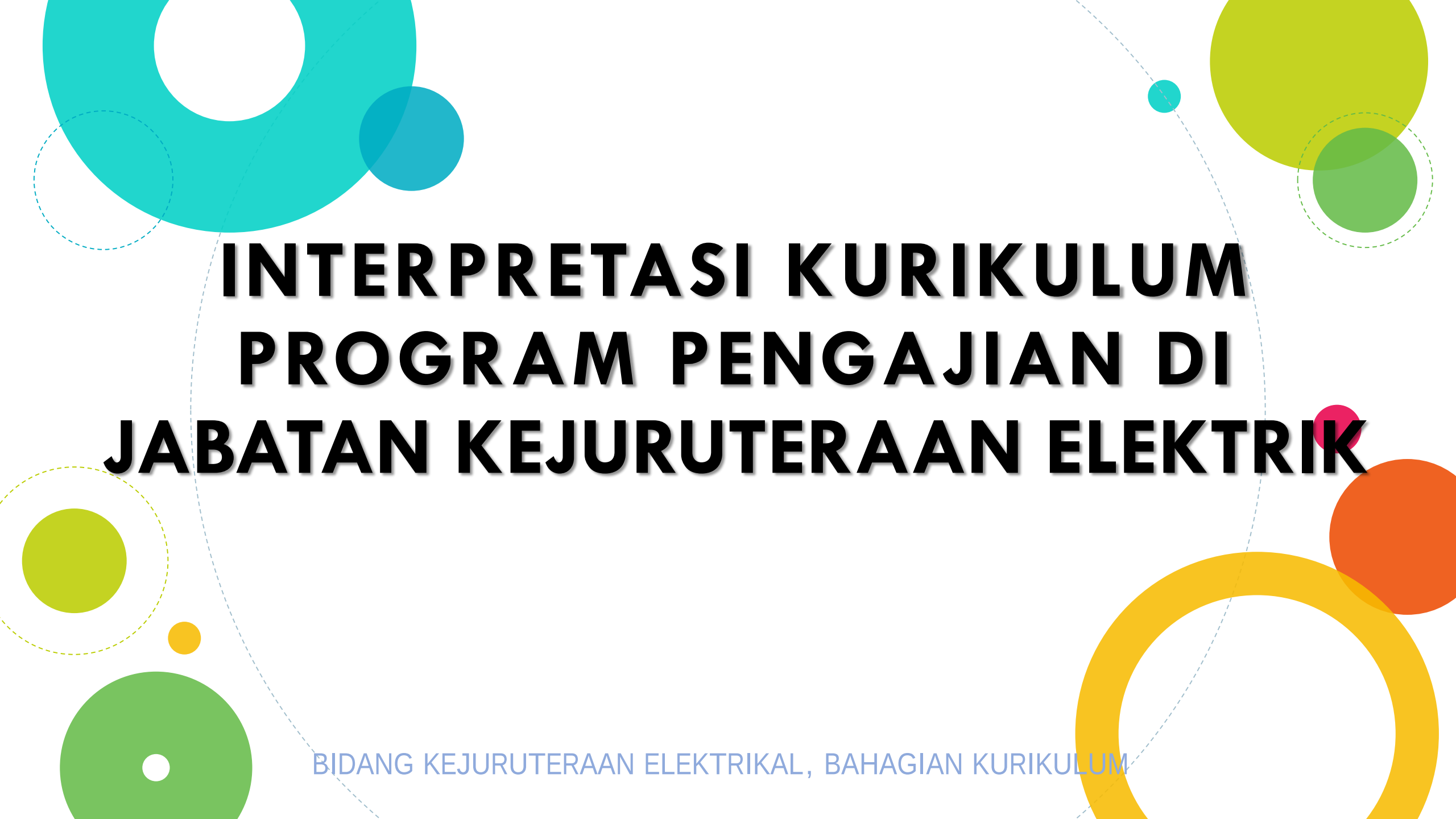
- Agensi Kelayakan Malaysia, (2011). *Garis Panduan: Amalam Baik: Rekabentuk dan Penyampaian Kurikulum*. Malaysia: Agensi Kelayakan Malaysia. www.mqa.gov.my
- Agensi Kelayakan Malaysia (2014). *Buku amalam baik: Penilaian pelajar*. Malaysia: Bahagian Standard, Agensi Kelayakan Malaysia. www.mqa.gov.my
- Agensi Kelayakan Malaysia (2014). *Garis Panduan Amalan Baik: Pemantauan, Penyemakan dan Penambahbaikan Kualiti Institusi Berterusan*. Malaysia: Agensi Kelayakan Malaysia. www.mqa.gov.my
- Agensi Kelayakan Malaysia (2017). *Kompilasi Dasar jaminan kualiti pendidikan tinggi (2009 – 2017), Edisi Kedua*. Malaysia: Bahagian Dasar dan Perancangan Strategik, MQA.
- Agensi Kelayakan Malaysia (2017). *Kerangka Kelayakan Malaysia Edisi Kedua*. Malaysia: Agensi Kelayakan Malaysia. www.mqa.gov.my
- Dr Roy killen (2000), *Outcome – Based Education: Principles and Possibilities*. Faculty of Education, University of Newcastle, Australia. <https://drjj.uitm.edu.my/DRJJ/CONFERENCE/UPSI/OBEKillen.pdf>
- Spady, William G. (2019), *Outcome Based Education: Critical Issues and Answer*. Arlington, VA: Amarican Association of School Administrators. <https://files.eric.ed.gov/fulltext/ED380910.pdf>
- Elizabeth Hauke (2017). *Constructive Alignment*. <http://livelovelearn.education/KnowledgeBase/2017/08/18/constructive-alignment/>
- Engineering Technology Accreditation council (2020). *Engineering Technician Education Programme Accreditation Standard 2020*. Malaysia: Board of Engineering. www.etac.org.my
- Engineering Technology Accreditation council (2020). *Engineering Technology Programme Accreditation Standard 2020*. Malaysia: Board of Engineering. www.etac.org.my
- Jabatan Pendidikan Tinggi, JPT (2018). *Garis Panduan Pembangunan Program Akademik Universiti Awam, Edisi ke dua*. Malaysia: Kementerian Pendidikan Malaysia.

- Jabatan Pendidikan Politeknik Sektor Akademik (2017). *Kredit dan Jam Pembelajaran (credit and student learning time SLT) Program Pengajian politeknik Malaysia*. Malaysia: Jabatan Pendidikan politeknik.
- McMahon & Thakore, (2006). *Using Biggs' Model of Constructive Alignment in Curriculum Design*.
http://www.ucdoer.ie/index.php?title=Using_Biggs%27_Model_of_Constructive_Alignment_in_Curriculum_Design/Introduction
- Surat Pekeliling Kurikulum Bil 7 Tahun 2019 – *Pelaksanaan Kurikulum Versi Jun 2019 Program Pengajian Bidang Kejuruteraan Elektrik Peringkat Diploma Politeknik Kementerian Pendidikan Malaysia*: JPPKK.BK.100-1/3/2(5) bertarikh 31 Mei 2019
- Surat Pekeliling Kurikulum Bil 8 Tahun 2019 – *Pelaksanaan Kursus MPU22042 Bahasa Kebangsaan A dalam Program Pengajian Politeknik*: JPPKK.BK.100-1/3/2(6) bertarikh 31 Mei 2019
- Surat Pekeliling Kurikulum Bil 9 Tahun 2019 – *Penawaran Kursus Free Elektif DUD10012 Design Thinking (DT) dalam Program Pengajian Diploma Politeknik*: JPPKK.BK.100-1/3/2(7) bertarikh 31 Mei 2019
- Surat Pekeliling Kurikulum Bil 10 Tahun 2019 – *Kaedah Pelaksanaan Kursus MPU U4 Kokurikulum Berkredit Jabatan/Unit Sukan Kokurikulum dan Kebudayaan bagi Pengajian Peringkat Diploma Politeknik Kementerian Pendidikan Malaysia*: JPPKK.BK.100-1/3/2(8) bertarikh 31 Mei 2019
- Surat Pekeliling Kurikulum Bil 18 Tahun 2020 – *Pelaksanaan Kurikulum Versi September 2019 Program Pengajian Ijazah Sarjana Muda Politeknik Kementerian Pendidikan Malaysia*: JPPKK.BK.100-1/3/2(16) bertarikh 23 Ogos 2019
- Surat Pekeliling Kurikulum Bil 25 Tahun 2019 – *Pelaksanaan Kursus DUT600610 Engineering Industrial Training dalam Program Pengajian Politeknik Kementerian Pendidikan Malaysia*: JPPKK.BK.100-1/3/2(23) bertarikh 7 November 2019







The background features several overlapping circles in teal, lime green, orange, and yellow. Some circles are solid, while others are dashed outlines. A thin, light blue dashed line curves across the page, passing through the text area.

INTERPRETASI KURIKULUM PROGRAM PENGAJIAN DI JABATAN KEJURUTERAAN ELEKTRIK

BIDANG KEJURUTERAAN ELEKTRIKAL, BAHAGIAN KURIKULUM

PENDAHULUAN

PROGRAM INFORMATION

ASAS PENAMBAHBAIKAN

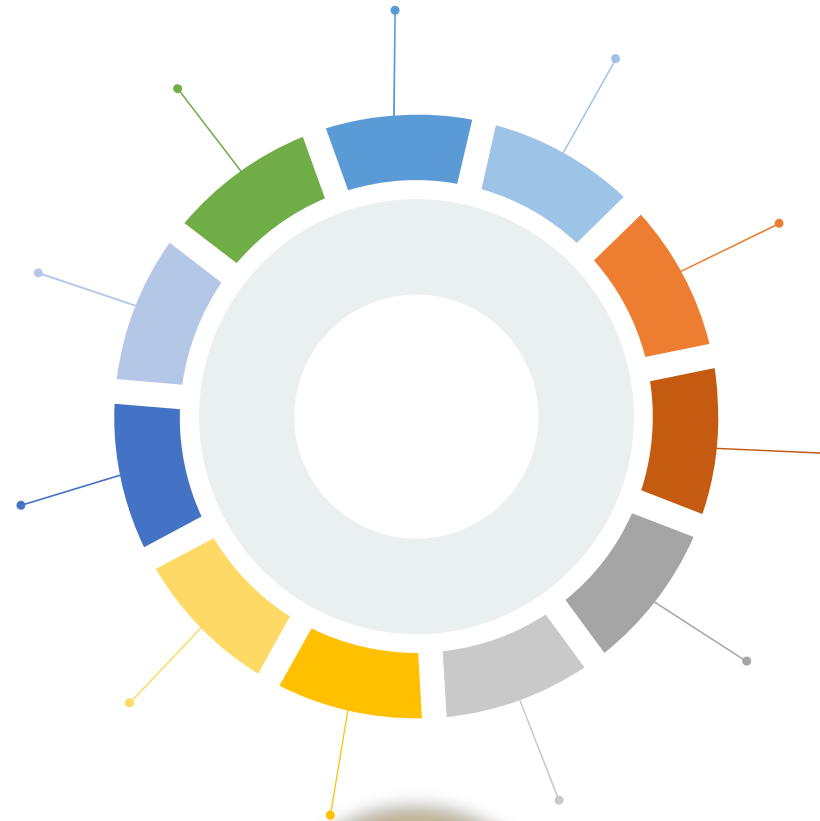
MQF 2.0

MAKLUMBALAS
KURIKULUM

PERUBAHAN
STANDARD

LAIN LAIN

PENERAPAN ELEMEN



MQF 2.0

Malaysian Qualifications Framework

- Malaysian Qualification Framework (MQF) 2.0 – 8 LOD kepada 5 Kluster Hasil Pembelajaran
- <http://www.mqa.gov.my/PortalMQAv3/default/en/mqf.cfm>
- menambah baik dan menyusun semula domain hasil pembelajaran ke dalam 5 kluster hasil pembelajaran;



MQF 2.0

MQF 2 (2017) EAC PO (2017) ETAC PO (2015)		Knowledge & Understanding (CLS 1)	Cognitive Skills (CLS 2)	Functional Work Skills			Personal & Entrepreneurial Skills (CLS 4)	Ethics & Professionalism (CLS 5)
				Practical Skills (CLS 3a)	Digital & Numeracy Skills (CLS 3c)	Interpersonal & Communication Skills (CLS 3b)		
PLO1: Engineering Knowledge		Knowledge						
PLO2: Problem Analysis			Scientific skills					
PLO3: Design/ Development of Solutions			Problem solving - Design					
PLO4: Investigation			Problem solving - Research					
PLO5: Modern Tool Usage				Practical/ psycho-motor skills	Information management			
PLO6: The Engineer and Society						Social skill		
PLO7: Environment and Sustainability								Social responsibility
PLO8: Ethics								Values, attitude & Professionalism
PLO9: Individual and Team Work							Leadership skill; Team skills	
PLO10: Communication						Communication skills		
PLO11: Project Management and Finance							Managerial skill; Entrepreneurial skill	
PLO12: Lifelong Learning							Personal skills	

LOD → *CLUSTER*

LOD

8

1. Knowledge (of the discipline)
2. Practical skills (of the discipline)
3. Social skills & responsibilities
4. Values, attitudes & professionalism
5. Communication, leadership & team work skills
6. Problem-solving & scientific skills
7. Information managements & lifelong learning skills
8. Managerial & entrepreneurial skills

CLUSTER

5

1. Knowledge and understanding;
2. Cognitive skills;
3. Functional work skills with focus on:
 - a. Practical skills;
 - b. Interpersonal skills;
 - c. Communication skills;
 - d. Digital skills;
 - e. Numeracy skills;
 - f. Leadership, autonomy and responsibility.
4. Personal and entrepreneurial skills;
5. Ethics and professionalism.

PUNCA KUASA



Agensi Kelayakan Malaysia
Malaysian Qualifications Agency

Tel : +603-7968 7044 | Faks : +603-7954 7125

KETUA PEGAWAI EKSEKUTIF
(Chief Executive Officer)
AGENSI KELAYAKAN MALAYSIA
(Malaysian Qualifications Agency)

www.mqa.gov.my
OFFICIAL : Agensi Kelayakan Malaysia (MQA)
MQA Malaysia (@MQAMalaysia)
MQA_Malaysia



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Tarikh : 30 Mac 2018

KEPADA SEMUA PEMBERI PENDIDIKAN TINGGI (PPT)

Tuan/Puan,

PEKELILING MQA BIL. 2/2018

PEMAKAIAN KERANGKA KELAYAKAN MALAYSIA (MALAYSIAN QUALIFICATIONS FRAMEWORK, MQF) EDISI KEDUA

Dengan hormatnya saya merujuk kepada perkara di atas.

2. Seperti yang tuan/puan sedia maklum, Agensi Kelayakan Malaysia (Malaysian Qualifications Agency, MQA) telah menerbitkan Kerangka Kelayakan Malaysia (Malaysian Qualifications Framework, MQF) Edisi Pertama pada tahun 2007. MQF Edisi Pertama ini telah dikuatkuasakan sepenuhnya pada 1 Januari 2011. MQF telah menjadi rujukan utama negara kepada semua pihak yang mempunyai kepentingan dalam pendidikan tinggi negara.

3. Bagi memastikan MQF kekal relevan, unggul dan berkesan di peringkat kebangsaan dan antarabangsa, MQA telah melaksanakan kajian semula terhadap MQF Edisi Pertama. Penambahbaikan ini telah mengambil kira ASEAN Qualifications Reference Framework (AQRF) agar sejajar dengan kerangka tersebut. Di samping itu, selaras dengan faktor perkembangan nasional dan global dalam pendidikan tinggi serta input daripada pihak berkepentingan, MQA telah membuat penambahbaikan terhadap MQF Edisi Pertama. MQF Edisi Kedua dihasratkan menjadi instrumen yang berupaya menghasilkan graduan yang holistik, memperkasakan program Akademik dan Pendidikan dan Latihan Teknikal dan Vokasional (TVET) serta terus menyokong pengukuhan budaya pembelajaran sepanjang hayat.

4. Hasil utama kajian semula adalah seperti berikut:

- mengekalkan ciri-ciri utama kerangka;
- mengurangkan tiga sektor (pendidikan tinggi, kemahiran dan teknikal dan vokasional) kepada dua sektor (Akademik dan TVET);
- menambah baik dan menyusun semula lapan domain nasir pembelajaran ke dalam lima cluster hasil pembelajaran;
- menambah baik dan memperincikan huraian hasil pembelajaran bagi setiap tahap; dan
- memperluaskan peluang pembelajaran sepanjang hayat.

5. MQF Edisi Kedua akan menjadi kerangka rujukan utama kepada Pemberi Pendidikan Tinggi (PPT) dalam jaminan kualiti untuk membangun dan menawarkan program pengajian tinggi negara. Justeru, penggunaan dan pematuhannya adalah terpakai kepada semua PPT seperti butiran berikut:

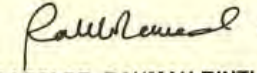
BIL.	TARIKH	REKOD
1.	01 April 2019	• Bagi program baharu yang memohon akreditasi sementara perlu menggunakan MQF Edisi Kedua sepenuhnya.
2.	01 April 2020	• Bagi program yang memohon akreditasi atau melalui audit pematuhan perlu menggunakan MQF Edisi Kedua sepenuhnya.

6. Untuk makluman juga, dokumen MQF Edisi Kedua boleh dirujuk dan dimuat turun melalui laman web MQA: www.mqa.gov.my.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Yang Ikhlas,


(DATO' DR. RAHMAH BINTI MOHAMED)
E-mel: rahmah@mqa.gov.my



MAKLUMBALAS KURIKULUM

- Maklumbalas daripada lawatan audit akreditasi dan pematuhan MQA
- Maklumbalas daripada lawatan audit akreditasi ETAC
- Maklumbalas dari industri serta badan professional
- Maklumbalas pensyarah

MAKLUMBALAS KURIKULUM

Maklumbalas Kurikulum
Pensyarah dan Pelajar
(online) akan dibuka
selepas satu semester
pelaksanaan kurikulum **Jun**
2019



Pautan maklumbalas akan diletakkan di CIDOS, SPMP, iPUO dan Portal JPPKK

PERUBAHAN STANDARD

- Code of Practice for Programme Accreditation (COPPA). Second Edition (2018)
- Engineering Technician Education Programme Accreditation Standard (2019)
- Standard program serta body of knowledge



PENERAPAN ELEMEN

- Penerapan elemen hijau dalam kurikulum
- Penerapan 4IR/Industry 4.0 (9 Pillars of Technological Advancement)



LAIN LAIN

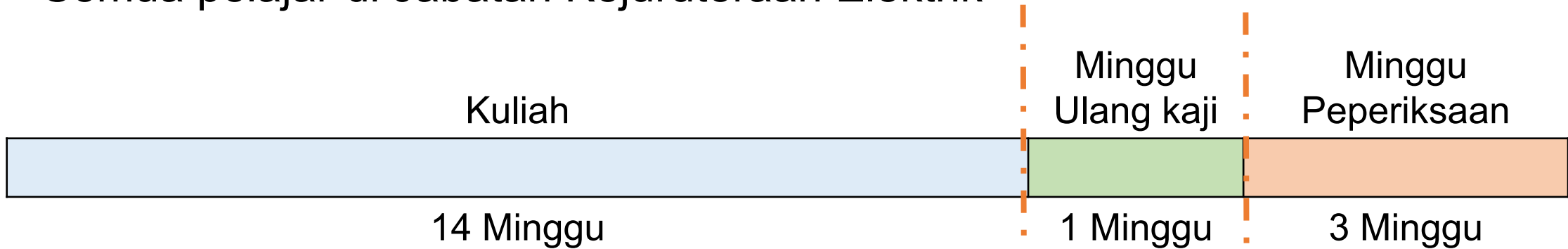
- Pelaksanaan 14 minggu perkuliahan
- Format terkini kurikulum versi 2019



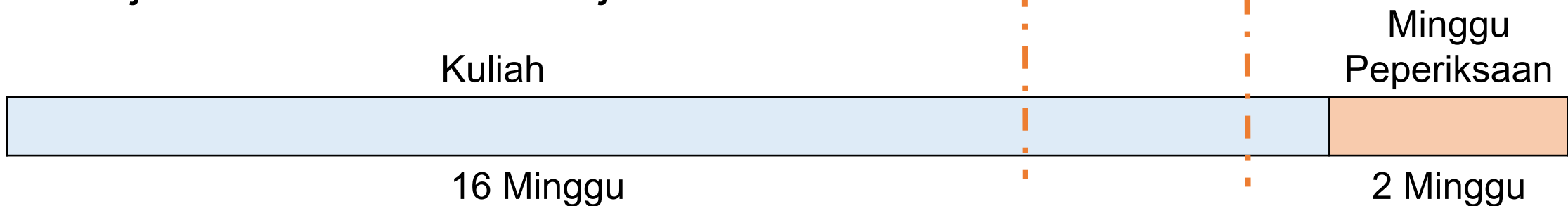
14 MINGGU KULIAH

Pelaksanaan

1. Kurikulum Versi Jun 2019 (14 Minggu Kuliah)
 - Semua pelajar di Jabatan Kejuruteraan Elektrik



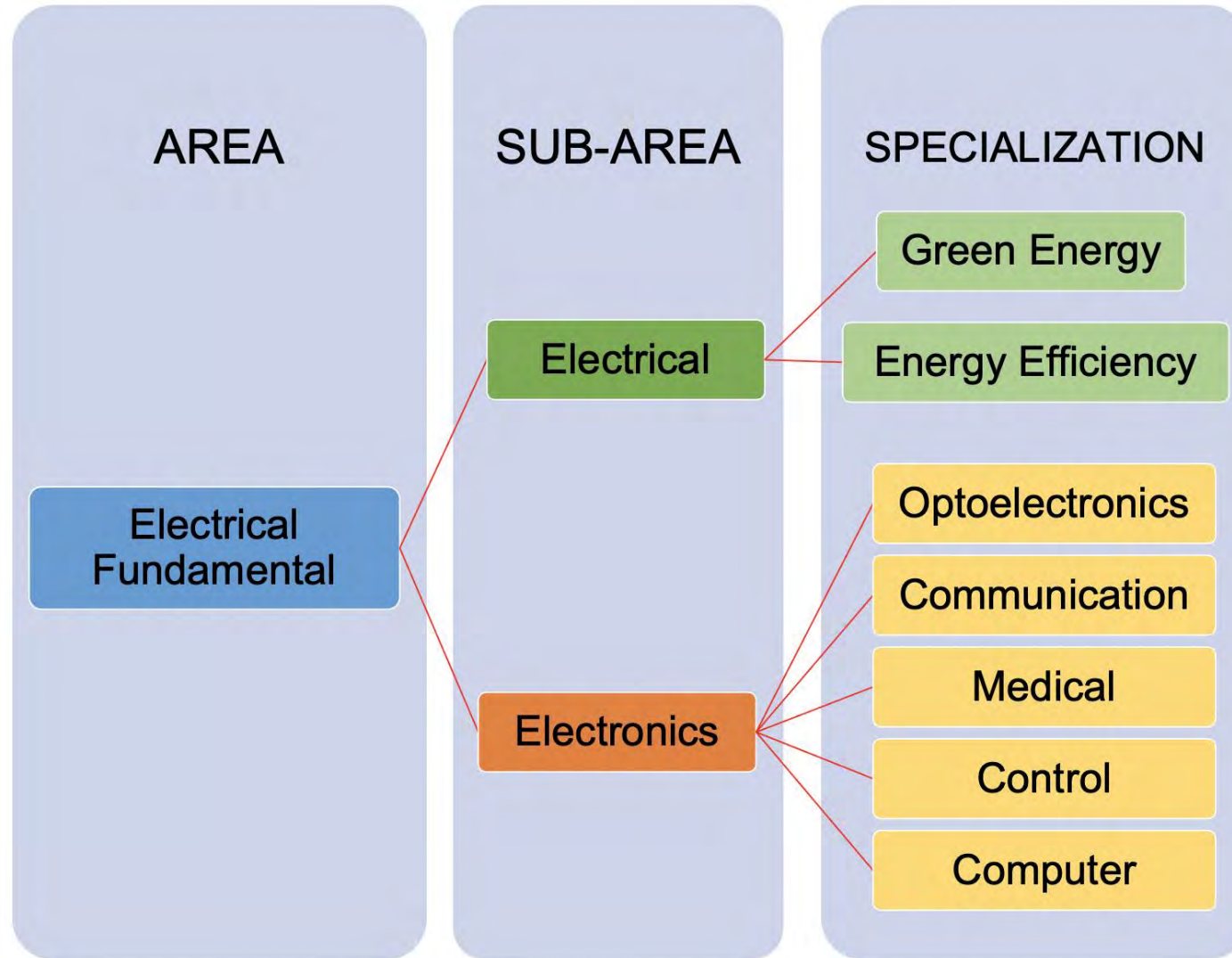
2. Kurikulum Versi Jun 2019 (16 Minggu Kuliah)
 - Pelajar selain di Jabatan Kejuruteraan Elektrik



BODY OF KNOWLEDGE (BoK)

Personal Development	Languages	Religious/ Moral Studies	Co-curricula	Entrepreneurship
Mathematics	Mathematics			
Sciences	Sciences			
Technical	Electrical			
Workplace Competencies	Occupational Safety & Health	Industrial Training	WBL	

BODY OF KNOWLEDGE (BoK)



SPEKIFIKASI DAN REKABENTUK

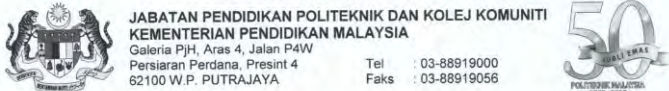
PERKARA	SPEKIFIKASI	
	DIPLOMA	
	MQA	ETAC
Jumlah Semester	Minimum 6 semester	Minimum 6 semester
Jumlah Kredit	Minimum 90 kredit	Minimum 90 kredit
Kredit Per Semester	Mengikut standard program (sekiranya standard program belum wujud hendaklah mengikut Body of Knowledge (BoK))	17-18 Nilai kredit
Jam Pertemuan Seminggu	Maksimum 32 jam seminggu	Maksimum 32 jam seminggu
Latihan Industri	9 kredit	10 Nilai kredit
Kursus Wajib	Mengikut standard program (sekiranya standard program belum wujud hendaklah mengikut Body of Knowledge (BoK))	Bergantung kepada gabungan kursus engineering dan kursus wajib
Kursus Teras Umum	Mengikut standard program (sekiranya standard program belum wujud hendaklah mengikut Body of Knowledge (BoK))	
Kursus Teras Disiplin	Mengikut standard program (sekiranya standard program belum wujud hendaklah mengikut Body of Knowledge (BoK))	Minimum 60 Nilai kredit daripada keseluruhan kredit program adalah kursus dalam bidang kejuruteraan. Bagi program yang mempunyai pengkhususan, 25-30% kandungan kursus kejuruteraan mestilah menjurus kepada pengkhususan tersebut.

SPEKIFIKASI DAN REKABENTUK

PERKARA	SPEKIFIKASI	
	DIPLOMA	
	MQA	ETAC
Kursus Pengkhususan	Mengikut standard program (sekiranya standard program belum wujud hendaklah mengikut Body of Knowledge (BoK))	25-30% kandungan kursus kejuruteraan mestilah menjurus kepada pengkhususan tersebut.
Kursus Elektif	Mengikut standard program (sekiranya standard program belum wujud hendaklah mengikut Body of Knowledge (BoK))	0 - 9 Nilai kredit
Peratusan Praktikal	Sekurang-kurangnya 60% daripada program adalah komponen praktikal	Minimum praktikal komponen adalah 50% daripada keseluruhan jumlah kredit bagi kursus dalam bidang kejuruteraan
Maksimum bilangan semester & maksimum minggu pengajian	2 semester panjang/setahun 1 semester pendek/setahun	2 semester panjang/setahun 1 semester pendek/setahun
	Maksimum bil minggu: 43 minggu/tahun	Maksimum bil minggu: 43 minggu/tahun

PELAKSANAAN KURIKULUM ELEKTRIK

Punca Kuasa



JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA
Galeria PjH, Aras 4, Jalan P4/W
Persiaran Perdana, Presint 4
62100 W.P. PUTRAJAYA

Tel : 03-88919000
Faks : 03-88919056

Ruj. Kami : JPPKK.BK.100-1/3/2 (5)
Tarikh : 31 MEI 2019

SEPERTI SENARAI EDARAN

YBrs. Dr./ Tuan/ Puan,

SURAT PEKELILING KURIKULUM BIL. 7 TAHUN 2019 BAGI PELAKSANAAN
KURIKULUM VERSI JUN 2019 PROGRAM PENGAJIAN DI BAWAH BIDANG
KEJURUTERAAN ELEKTRIK PERINGKAT DIPLOMA POLITEKNIK
KEMENTERIAN PENDIDIKAN MALAYSIA

Dengan hormatnya saya merujuk kepada perkara di atas.

2. Sukacita dimaklumkan bahawa Mesyuarat Lembaga Kurikulum Kursus Pengajian dan Program Latihan Politeknik (MLK) Bil 1/2019 bertarikh 23 April 2019, telah meluluskan dokumen kurikulum versi Jun 2019 bagi 61 program pengajian peringkat diploma politeknik (seperti di Lampiran 1) bersama-sama dengan kursus-kursus Pengajian Am, Matematik, Sains, Komputer dan Matapelajaran Umum (MPU).

3. Adalah dimaklumkan, pelaksanaan kurikulum versi Jun 2019 bagi program di bawah bidang Kejuruteraan Elektrik adalah untuk kohort baharu dan sedia ada (Semester 2 hingga Semester 6). Pelaksanaannya adalah berdasarkan Garis Panduan Pelaksanaan Serentak Kurikulum 2019 Program Kejuruteraan Elektrik & Elektronik Politeknik Malaysia yang dikeluarkan oleh Bahagian Kurikulum JPPKK. Dengan ini, dokumen kurikulum versi terdahulu bagi program di bawah bidang Kejuruteraan Elektrik adalah **TERBATAL**.

- Pelaksanaan kurikulum versi Jun 2019 bagi program di bawah bidang Kejuruteraan Elektrik adalah untuk kohort baharu dan sedia ada (Semester 2 hingga Semester 5).
- Pelaksanaannya adalah berdasarkan Garis Panduan Pelaksanaan Serentak Kurikulum 2019 Program Kejuruteraan Elektrik & Elektronik Politeknik Malaysia yang dikeluarkan oleh Bahagian Kurikulum JPPKK
- Dengan ini, dokumen kurikulum versi terdahulu bagi program di bawah bidang Kejuruteraan Elektrik adalah **TERBATAL**.

PELAKSANAAN SERENTAK



GARIS PANDUAN PELAKSANAAN
SERENTAK KURIKULUM JUN 2019
PROGRAM KEJURUTERAAN ELEKTRIK DAN
ELEKTRONIK POLITEKNIK MALAYSIA

Bidang Kejuruteraan Elektrik
Bahagian Kurikulum
Jabatan Pendidikan Politeknik Dan Kolej Komuniti
Kementerian Pendidikan Malaysia
Berkualiti 31 Mei 2019

- ❑ *Concern Akreditasi program DET PSAS (2017) dan DEP – 18 Politeknik (2018)*

“Final Year Project credit units does not fulfilled the qualifying requirement of ETAC”

“The current 11 outcomes of MQA standard are not directly aligned with the corresponding ETAC 12 PO and are yet to address sufficiently the requirement concerning Environment, Project Management and Finance.”

PELAKSANAAN SERENTAK



- ☐ Kursus-kursus tahap 1 sehingga 3 DET & DEP – di guna sama oleh semua program Kejuruteraan Elektrik dan sebarang pindaan kurikulum akan melibatkan semua program kejuruteraan elektrik yang lain
- ☐ Jabatan hanya perlu menggunakan 1 Kalendar Akademik pengajian sahaja.
- ☐ Semua pelajar yang akan bergraduat harus mendapat impak penambahbaikan yang berkaitan dengan keperluan terkini seperti yang disarankan oleh **ETAC**.

DOKUMEN KURIKULUM

PROGRAMME INFORMATION

Klasifikasi Dokumen

- Dokumen ini diklasifikasikan sebagai **DOKUMEN TERHAD / RESTRICTED** dan pengedaran **salinan terkawal** dokumen (*hardcopy* atau *softcopy*) adalah terhad kepada tenaga pengajar politeknik sahaja.
- Urusan dokumentasi **salinan terkawal** dokumen kurikulum ini perlu mengikut keperluan sistem pengurusan kualiti politeknik masing-masing.
- Edaran **salinan terkawal** dokumen (*hardcopy* atau *softcopy*) perlu disahkan oleh pegawai kualiti politeknik. Edaran **salinan terkawal** dokumen (*hardcopy* atau *softcopy*) adalah tidak dibenarkan kepada pihak luar.

RESTRICTED

Diploma in Electrical and Electronic Engineering

PROGRAMME INFORMATION	
	DEPARTMENT OF POLYTECHNIC AND COMMUNITY COLLEGE EDUCATION, MINISTRY OF EDUCATION MALAYSIA
1	INTRODUCTION Electrical engineering is the field of study which generally deals with the application of electrical and electronics towards designing, testing and development of circuitry and equipment for well-defined engineering activities. It requires the application of scientific and engineering knowledge and methods combined with practical skills in supporting well-defined engineering activities to prepare students for their future role in the industry. The electrical engineering diploma graduates of the Polytechnic's Ministry of Education Malaysia are exposed to a comprehensive curriculum consisting of courses in personal development, mathematics, science, electrical disciplines and workplace competencies requirements. Graduates of the electrical engineering diploma programme will be equipped with specialized knowledge and skills which include power engineering, green technology, energy efficiency, computer technology, communication, medical electronics, optoelectronic and industrial automation. The Diploma in Electrical and Electronic Engineering is a three-year full-time programme comprising of five semesters coursework with one full semester of industrial training.
2	SYNOPSIS The Diploma in Electrical and Electronic Engineering programme is designed to cover the broad discipline of electrical and electronic engineering which includes electrical and electronic principles, computer fundamental and programming, computer aided design, semiconductor devices, communication systems, wiring installation, power system, electrical machine and programmable logic controller. The green technology elements are also incorporate in the curriculum to provide awareness towards the importance of the sustainable energy.

DOKUMEN KURIKULUM

PROGRAMME INFORMATION

RESTRICTED

Diploma in Electrical and Electronic Engineering

Nama Program

PROGRAMME INFORMATION	
	DEPARTMENT OF POLYTECHNIC AND COMMUNITY COLLEGE EDUCATION, MINISTRY OF EDUCATION MALAYSIA

1	INTRODUCTION Electrical engineering is the field of study which generally deals with the application of electrical and electronics towards designing, testing and development of circuitry and equipment for well-defined engineering activities. It requires the application of scientific and engineering knowledge and methods combined with practical skills in supporting well-defined engineering activities to prepare students for their future role in the industry. The electrical engineering diploma graduates of the Polytechnic's Ministry of Education Malaysia are exposed to a comprehensive curriculum consisting of courses in personal development, mathematics, science, electrical disciplines and workplace competencies requirements. Graduates of the electrical engineering diploma programme will be equipped with specialized knowledge and skills which include power engineering, green technology, energy efficiency, computer technology, communication, medical electronics, optoelectronic and industrial automation. The Diploma in Electrical and Electronic Engineering is a three-year full-time programme comprising of five semesters coursework with one full semester of industrial training.
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Bil	Nama Program	Kod Program
1	Diploma Kejuruteraan Elektrik	DET
2	Diploma Kejuruteraan Elektronik (Kawalan)	DJK
3	Diploma Kejuruteraan Elektronik (Komputer)	DTK
4	Diploma Kejuruteraan Elektronik (Komunikasi)	DEP
5	Diploma Kejuruteraan Elektrik & Elektronik	DEE
6	Diploma Kejuruteraan Elektronik (Optoelektronik)	DEO
7	Diploma Kejuruteraan Elektronik (Perubatan)	DEU
8	Diploma Kejuruteraan Elektrik (Tenaga Hijau)	DEG
9	Diploma Kejuruteraan Elektrik (Kecekapan Tenaga)	DEQ

DOKUMEN KURIKULUM

PROGRAMME INFORMATION

RESTRICTED

Diploma in Electrical and Electronic Engineering

Versi Kurikulum

Version: 230419 _1_ Effective: June2019

Tarikh kelulusan
Mesyuarat Lembaga
Kurikulum

Nombor versi

Semester berkuatkuasa

PROGRAMME INFORMATION	
	DEPARTMENT OF POLYTECHNIC AND COMMUNITY COLLEGE EDUCATION, MINISTRY OF EDUCATION MALAYSIA

1	INTRODUCTION Electrical engineering is the field of study which generally deals with the application of electrical and electronics towards designing, testing and development of circuitry and equipment for well-defined engineering activities. It requires the application of scientific and engineering knowledge and methods combined with practical skills in support of well-defined engineering activities to prepare students for their future role in the industry. The electrical engineering diploma graduates of the Polytechnic's Ministry of Education Malaysia are exposed to a comprehensive curriculum consisting of courses of personal development, mathematics, science, electrical disciplines and workplace competencies requirements. Graduates of the electrical engineering diploma programme will be equipped with specialized knowledge and skills which include power engineering, green technology, energy efficiency, computer technology, communication, medical electronics, optoelectronic and industrial automation. The Diploma in Electrical and Electronic Engineering is a three-year full-time programme comprising of five semesters coursework with one full semester of industrial training.
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Version: 230419	_1_	Effective: June 2019
Date of Mesyuarat Lembaga Kurikulum (MLK)	The curriculum version number	Effective semester

PROGRAMME INFORMATION

PERUBAHAN KURIKULUM

Perbezaan

Jun 2014	Jun 2019
Akreditasi MQA	Akreditasi ETAC
11 PLO MQA	12 PLO ETAC / 5 Cluster MQF 2.0
16 minggu perkuliahan	14 minggu perkuliahan
Taksonomi Bloom	Taksonomi Politeknik 2016
CA : FE → 50 : 50	CA : FE → 60 : 40
AST (assessment specification table)	ASSESSMENT
GSA tidak menyumbang kepada CA	5% markah GSA, menyumbang kepada CA
Project 1 & 2 – 3 Kredit	Project 1 & 2 – 4 Kredit

PERUBAHAN KURSUS PROJECT

2

SYNOPSIS:

PROJECT 2 is the continuation of DEE40082 PROJECT 1 course. The course focuses on methods of circuit construction, testing, troubleshooting, debugging, repair and also completion of the project which was planned during the previous semester. This course also requires students to manage an economical engineering based project, prepare a project report in a given format and deliver a project presentation at the end of the semester. The students are allowed to do an individual or group project but will be assessed individually through the project assessment tasks throughout the course.

Kursus: DEE50102 Project 2

PERUBAHAN KURSUS PROJECT

□ Final Year Project

The final year project, consisting of either industry-based or practice-oriented projects, can provide one of the best means of introducing a real professional approach to engineering studies and practices. For this reason, the use of projects as a vehicle for teaching and for integration of core areas is strongly encouraged throughout the programme.

It is a requirement of the programme to include a significant project in its later stages. The final year project is required to seek individual analysis and judgement, capable of being assessed independently from the work of others.

Sumber: ENGINEERING TECHNICIAN EDUCATION PROGRAMME ACCREDITATION STANDARD, M/S16

PROGRAMME INFORMATION

Dokumen Kurikulum - *Introduction, Synopsis*

Introduction

RESTRICTED

Diploma in Electrical and Electronic Engineering

PROGRAMME INFORMATION	
	DEPARTMENT OF POLYTECHNIC AND COMMUNITY COLLEGE EDUCATION, MINISTRY OF EDUCATION MALAYSIA
1	INTRODUCTION Electrical engineering is the field of study which generally deals with the application of electrical and electronics towards designing, testing and development of circuitry and equipment for well-defined engineering activities. It requires the application of scientific and engineering knowledge and methods combined with practical skills in supporting well-defined engineering activities to prepare students for their future role in the industry. The electrical engineering diploma graduates of the Polytechnic's Ministry of Education Malaysia are exposed to a comprehensive curriculum consisting of courses in personal development, mathematics, science, electrical disciplines and workplace competencies requirements. Graduates of the electrical engineering diploma programme will be equipped with specialized knowledge and skills which include power engineering, green technology, energy efficiency, computer technology, communication, medical electronics, optoelectronic and industrial automation. The Diploma in Electrical and Electronic Engineering is a three-year full-time programme comprising of five semesters coursework with one full semester of industrial training.
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Synopsis

VISION, MISSION, EDUCATIONAL GOAL

PROGRAMME INFORMATION

4	VISION To be the Leading-Edge TVET Institution
5	MISSION a. To provide wide access to quality and recognized TVET programmes b. To empower communities through lifelong learning c. To develop holistic, entrepreneurial and balanced graduates d. To capitalise on smart partnership with stakeholders
6	EDUCATIONAL GOAL To produce holistic and competent TVET graduates capable of contributing to the national development



Sumber: Surat HalaTuju Strategik Politeknik dan Kolej Komuniti, bertarikh 20 Mac 2018

PROGRAMME AIM

PROGRAMME INFORMATION

7

PROGRAMME AIM

This programme believes that all individuals have potential to be a resourceful and adaptable technician to support the nation aspiration in providing engineering talent

PROGRAMME EDUCATIONAL OUTCOME (PEO)

PROGRAMME INFORMATION

PEO		Keyword	Description
PEO1	Practicing technician in electrical engineering related field	Technician in Electrical and Electronic field	Describes a technician who works in any industry with job function in electrical or electronic discipline.

PEO

PROGRAMME INFORMATION

PEO		Keyword	Description
PEO2	Contributing to society with professional ethic and responsibilities	Role of graduates	Describes the graduates involvement in community activities which includes engineering and non-engineering work related to society, health and safety. During the activities, graduate instill awareness of the safety and health culture and suggest solution pertaining to of environment and sustainability to the community. In performing the activities, the graduates adhere to professional ethic and responsibilities by following rules and regulation of the field.

PEO

PROGRAMME INFORMATION

PEO		Keyword	Description
PEO3	Engaging in enterprising activities that apply engineering knowledge and technical skills	Enterprising Activities	Describes the enterprising activities which require effective communication and contribution as a team member. Enterprising activities involved business in engineering, research and development (R&D) and technical project. Enterprising activities can be online or offline business. It also can be pursued either full time or part time basis.

PEO

PROGRAMME INFORMATION

PEO		Keyword	Description
PEO4	Engaging in activities to enhance knowledge for successful career advancement	Career Advancement	Describes the future achievement of the graduates. The graduates have the opportunities to further their studies to a higher level such as advanced diploma, degree, master or PhD. Graduates can also upgrade their knowledge and adapting to new technologies by attaining professional certification. For career advancement criteria, the graduates are expected to hold senior position post such as senior technician, project manager, consultant and supervisor.

PROGRAMME LEARNING OUTCOME (PLO)

PROGRAMME INFORMATION

PLO1	Knowledge: Apply knowledge of applied mathematics, applied science, engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices;
PLO2	Problem analysis: 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/development of solutions: 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);

PLO

PROGRAMME INFORMATION

PLO4	Investigation: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements;
PLO5	Modern Tool Usage: Apply appropriate techniques, resources, and modern engineering and IT tools to well- defined engineering problems, with an awareness of the limitations (DK6);
PLO6	The Engineer and Society: 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);

PLO

PROGRAMME INFORMATION

PLO7	Environment and Sustainability: 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	Ethics: Understand and commit to professional ethics and responsibilities and norms of technician practice;
PLO9	Individual and Team Work: Function effectively as an individual, and as a member in diverse technical teams;

PLO

PROGRAMME INFORMATION

PLO10	Communications: 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	Project Management and Finance: Demonstrate knowledge and understanding of engineering management principles and apply them to one's own work, as a member or leader in a technical team and to manage projects in multidisciplinary environments;
PLO12	Life Long Learning: Recognise the needs for, and have the ability to engage in independent updating in the context of specialised technical knowledge;

DUBLIN KNOWLEDGE

PROGRAMME INFORMATION

DK1	A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline
DK2	Procedural mathematics , numerical analysis, statistics applicable in a subdiscipline
DK3	A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline
DK4	Engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline
DK5	Knowledge that supports engineering design based on the techniques and procedures of a practice area
DK6	Codified practical engineering knowledge in recognised practice area
DK7	Knowledge of issues and approaches in engineering technician practice: ethics, financial, cultural, environmental and sustainability impacts

PLO VS PEO

PROGRAMME INFORMATION

PROGRAM LEARNING OUTCOME (PLO)		PROGRAMME EDUCATIONAL OBJECTIVE (PEO)			
		PEO1	PEO2	PEO3	PEO4
PLO1	apply knowledge of applied mathematics, applied science, engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices;	/			
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);		/		

PLO VS PEO

PROGRAMME INFORMATION

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

PROGRAMME INFORMATION

COURSE CLASSIFICATION	DESCRIPTION
Compulsory	Courses sanctioned by MOE and JPPKK such as Matapelajaran Umum (MPU), languages, Mathematics, Sciences and Technology, Unit Beruniform, Persatuan, Clubs e.g: MPU22012 Entrepreneurship, DUE30022 Communicative English 2 , MPU21012 Pengajian Malaysia
Common core	Fundamental courses that must be taken by students in the department. e.g: DBM30043 Electrical Engineering Mathematics.
Discipline core	Core courses offered by the field of study. e.g: Electrical Wiring
Specialization	Courses offered in the programme with specialisation. e.g: Diploma in Electronic Engineering (Communication), specialized course offered is Communication
Elective	Courses that students can choose from other disciplines for value added.
Free Elective	Courses which are not included in any programme structure but if taken, will contribute towards students' CGPA

PRE REQUISITE/CO-REQUISITE

- **PRE-REQUISITE:**
A course or other requirement that a student must have taken prior to enrolling in a specific course or program.
- **CO-REQUISITE:** A course or other requirement that a student must take at the same time as another course or requirement.

LPTO

PROGRAMME INFORMATION

L	A method of delivery where students are given the theoretical input and guidance necessary to achieve the learning outcome.
P	Practice-oriented learning experiences should engage students with the use of facilities, equipment and instrumentation reflective of current industry practice which will help in developing competence in executing applied and experimental work. ETAC, pg.14, 2019
T	Tutorial complements lecture.
O	Any active experiential learning method that engages students in learning through experience and requires them to reflect on what they are learning. Involve the gathering of anthropological or sociological data through the interviewing and observation of subjects in the field.

KURSUS ELEKTIF

PROGRAMME INFORMATION

	Total Credit	%
i. (a) Compulsory	14	15%
(b) Compulsory (Bahasa Kebangsaan A) ^b	2 ^b	0%
ii. Common Core	13	14%
iii. Discipline Core	54	57%
Total Credit	81	
iv. (a) Electives	4	4%
(b) Free Electives ^a	2 ^a	0%
v. Industrial Training	10	11%
Grand Total Credit	95	100%

Engineering & Engineering Technology Courses	Total Hours	%
i. Lecture	32	42%
ii. Practical	45	58%
iii. Tutorial	0	0%
Total Contact Hours	77	100%

- Kredit minimum - 4 kredit
- Kursus Elektif dibenarkan merentas bidang.
- Mana-mana kursus yang tidak ada dalam struktur program boleh ditawarkan sebagai kursus elektif
- Perlu patuh kepada **pra syarat kursus**
- Sekiranya kursus yang ditawarkan **BUKAN** bidang Kejuruteraan politeknik perlu memaklumkan kepada UKE, JPPKK untuk menentukan mapping PLO ETAC

LATIHAN INDUSTRI

PROGRAMME INFORMATION

	Total Credit	%
i. (a) Compulsory	14	15%
(b) Compulsory (Bahasa Kebangsaan A) ^b	2 ^b	0%
ii. Common Core	13	14%
iii. Discipline Core	54	57%
Total Credit	81	
iv. (a) Electives	4	4%
(b) Free Electives ^a	2 ^a	0%
v. Industrial Training	10	11%
Grand Total Credit	95	100%

Engineering & Engineering Technology Courses	Total Hours	%
i. Lecture	32	42%
ii. Practical	45	58%
iii. Tutorial	0	0%
Total Contact Hours	77	100%

SEMESTER					
Industrial Training	DUT600610	Engineering Industrial Training	0	0	0
			0	0	10

PROGRAM KEJURUTERAAN
DUT600610 Engineering Industrial
Training: 10 kredit

*** Berkuatkuasa pada sesi**
Disember 2019

*** Sesi Jun 2019 masih**
menggunakan kod LI DUT40010

KOMPONEN PRAKTIKAL

PROGRAMME INFORMATION

	Total Credit	%
i. (a) Compulsory	14	15%
(b) Compulsory (Bahasa Kebangsaan A) ^b	2 ^b	0%
ii. Common Core	13	14%
iii. Discipline Core	54	57%
Total Credit	81	
iv. (a) Electives	4	4%
(b) Free Electives ^a	2 ^a	0%
v. Industrial Training	10	11%
Grand Total Credit	95	100%

Engineering & Engineering Technology Courses	Total Hours	%
i. Lecture	32	42%
ii. Practical	45	58%
iii. Tutorial	0	0%
Total Contact Hours	77	100%

- Pengiraan komponen Praktikal adalah mengambil kira *Contact Hours* bagi kursus-kursus *Discipline Core* dan/atau *Specialisation*
- Standard ETAC mewajibkan 50% komponen praktikal dalam kurikulum

KOMPONEN PRAKTIKAL

PROGRAMME INFORMATION

(c) Practice-oriented components

Engineering or engineering technology diploma programme shall ensure that 50% time should be allocated for practice-oriented components. Students should be able to practise engineering skills to complement engineering theory that is learnt through lectures. Practice-oriented learning experiences should engage students with the use of facilities, equipment and instrumentation reflective of current industry practice which will help in developing competence in executing applied and experimental work. Students should work in groups, preferably not more than four in a group.

BAHASA KEBANGSAAN A

PROGRAMME INFORMATION

Garis Panduan Matapelajaran Pengajian Umum Edisi Kedua (2017) :

“Pelajar warganegara yang tidak mendapat kredit/kepujian (Gred C) di dalam Bahasa Melayu peringkat SPM maka **DIWAJIBKAN** mengambil kursus Bahasa Kebangsaan A sebagai komponen U2”

Rujukan: Surat JPT.(A)1000/016/018/57 Jld. 5(33) bertarikh 23 Januari 2017

Jadual 1.3 : Pelaksanaan Kelompok U2, U3, Dan U4

U2 (2 atau 3 kredit)	U3 (2 atau 3 kredit)	U4 (2 kredit)	Bahasa Pengantar	
Kemahiran Kepimpinan dan Hubungan Insan	Ekonomi Malaysia	Khidmat Masyarakat	Bahasa Melayu	Bahasa Inggeris
Kemahiran Reka cipta dan Inovasi	Kerajaan dan Dasar Awam Malaysia	Ko-kurikulum	✓	✓
Kemahiran Menulis	Perlakuan Organisasi Dalam Masyarakat Pelbagai Etnik Malaysia	Atau lain-lain yang dicadangkan oleh KPT dan IPT	✓	✓
Kemahiran Berfikir	Perbandingan Agama		✓	✓
Kemahiran Keusahawanan	Etika Perbandingan		✓	✓
Atau lain-lain yang dicadangkan oleh KPT dan IPT	Atau lain-lain yang dicadangkan oleh KPT dan IPT		✓	✓

Nota:

- ❖ Kursus-kursus U2-U4 ditetapkan oleh IPT.
- ❖ Bagi pelajar warganegara yang tidak mendapat kredit di dalam kursus Bahasa Melayu peringkat Sijil Pelajaran Malaysia (SPM) maka **DIWAJIBKAN** mengambil kursus Bahasa Kebangsaan A sebagai komponen U2.

Sumber: Garis Panduan MPU, Edisi Kedua (2017)

BAHASA KEBANGSAAN A

PROGRAMME INFORMATION

	Total Credit	%
i. (a) Compulsory	14	15%
(b) Compulsory (Bahasa Kebangsaan A) ^b	2 ^b	0%
ii. Common Core	13	14%
iii. Discipline Core	54	57%
Total Credit	81	
iv. (a) Electives	4	4%
(b) Free Electives ^a	2 ^a	0%
v. Industrial Training	10	11%
Grand Total Credit	95	100%

- ☐ Bermula **AMBILAN JUN 2019**
- ☐ Diwajibkan ke atas pelajar yang tidak mendapat kredit dalam Bahasa Melayu SPM
- ☐ Pelaksanaan di JKE:
 - ☐ Tidak perlu menambah jam kredit bergraduat kerana boleh diletakkan di bawah kredit elektif

KURSUS *FREE ELECTIVE*

PROGRAMME INFORMATION

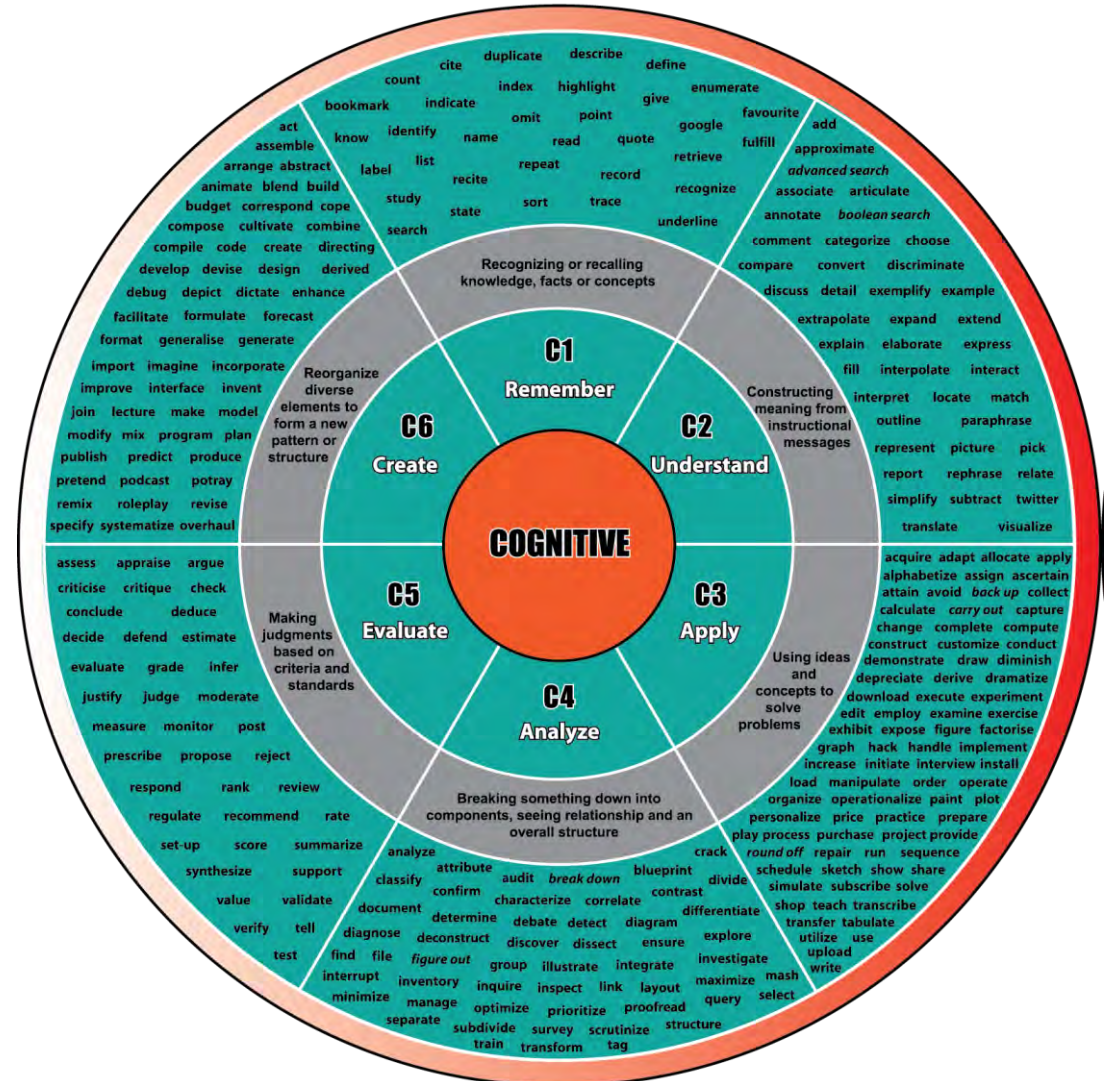
	Total Credit	%
i. (a) Compulsory	14	15%
(b) Compulsory (Bahasa Kebangsaan A) ^b	2 ^b	0%
ii. Common Core	13	14%
iii. Discipline Core	54	57%
Total Credit	81	
iv. (a) Electives	4	4%
(b) Free Electives^a	2^a	0%
v. Industrial Training	10	11%
Grand Total Credit	95	100%

Rujukan: Surat Pekeliling Kurikulum Bil.9 Tahun 2019 JPPKK.BK.100-1/3/2 (7)
bertarikh 31 Mei 2019

- ❑ Penawaran – bermula pada sesi Jun 2019
- ❑ Kaedah pelaksanaannya adalah tertakluk kepada institusi
- ❑ Pelaksanaan kursus ini adalah berpandukan kepada garis panduan ***FREE ELECTIVE GUIDELINE : DESIGN THINKING***
- ❑ *Free Elective* DT dirintiskan kepada PPD dan PTSB.
- ❑ Namun, mana-mana institusi yang berminat untuk menawarkan *free elective* DT ini perlu memaklumkan kepada **Unit Penilaian dan Inovasi Kurikulum, Bahagian Kurikulum**

TAKSONOMI

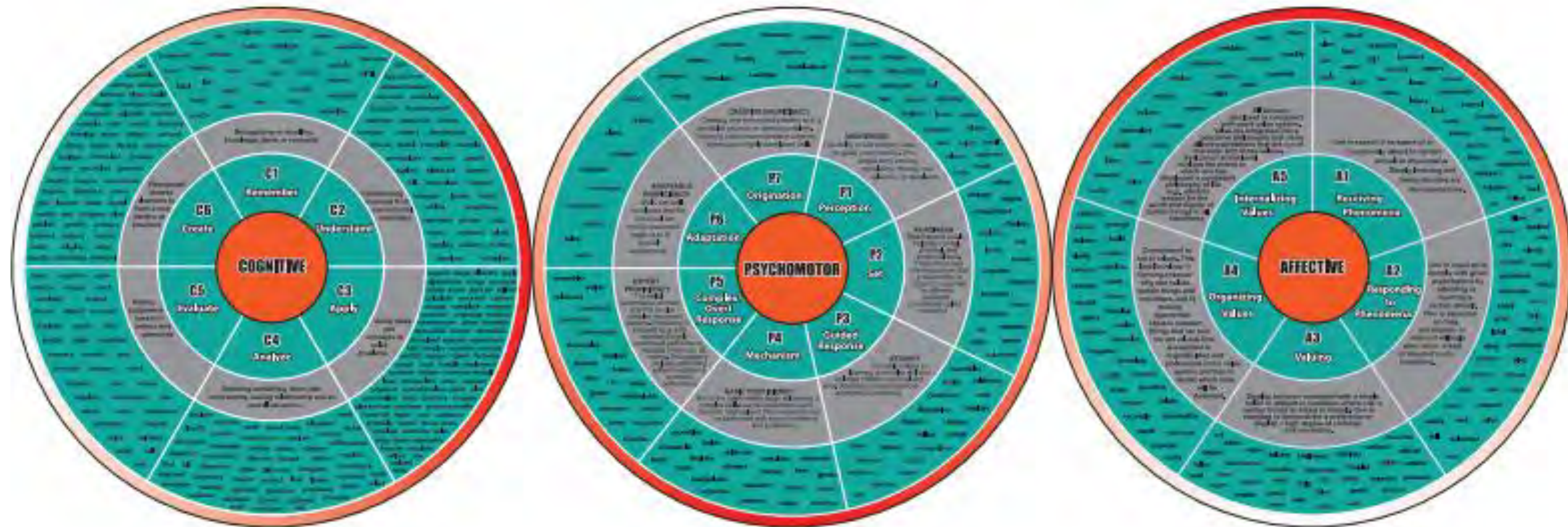
TAKSONOMI



TAKSONOMI

POLITEKNIK MALAYSIA

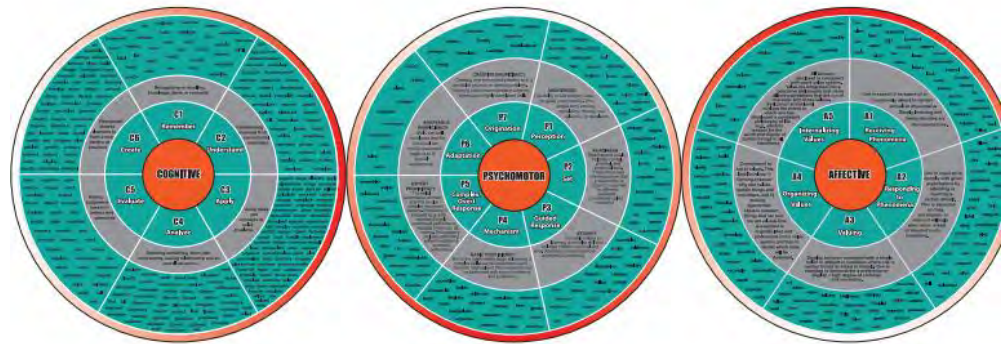
2016



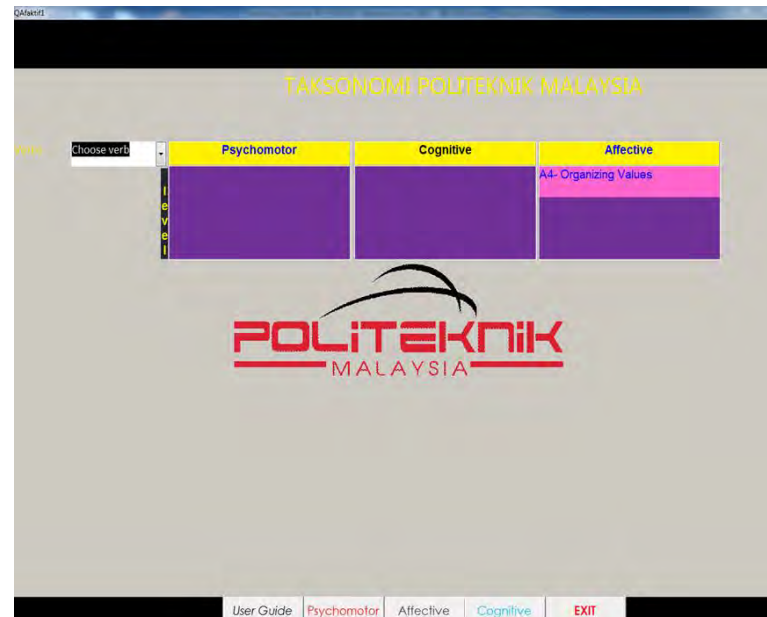
JKE menggunakan Taksonomi Politeknik Malaysia 2016

TAKSONOMI

TAKSONOMI
POLITEKNIK MALAYSIA
2016



Taksonomi Politeknik Malaysia 2016



• Aplikasi Taksonomi Politeknik 2016

• Surat Pemakluman

Ruj. Kami : JPPKK.BK. 600-5/4/3 (05)
Tarikh : 12 April 2019

Pengarah Politeknik,
Pengarah Kolej Komuniti,
Kementerian Pendidikan Malaysia

YBrs. Dr. / Tuan / Puan,

PEMAKLUMAN TAKSONOMI PEMBELAJARAN UNTUK POLITEKNIK DAN KOLEJ KOMUNITI

Dengan hormatnya saya merujuk kepada perkara di atas.

2. Sukacita dimaklumkan bahawa Bahagian Kurikulum (BK), Jabatan Pendidikan Politeknik dan Kolej Komuniti (JPPKK) menggunakan Taksonomi Pembelajaran untuk hal-hal berkaitan akademik seperti dalam penyataan *Course Learning Outcome (CLO)*, penyataan *General Statement (GS)* dan *Specific Statement (SS)* dalam kurikulum, pembangunan *Course Item Specification Table (CIST)* serta *Final Examination Item Specification Table (FEIST)*.

3. Para pensyarah boleh menggunakan Taksonomi Politeknik 2016 dan dibaca bersama Taksonomi Pembelajaran yang dinyatakan dalam Garis Panduan Amalan Baik Penilaian Pelajar (MQA, 2013) yang merujuk kepada:

- Cognitive Domain: A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives (Anderson & Krathwohl ed., 2001).*
- Psychomotor Domain: The Classification of Educational Objectives in the Psychomotor Domain. Washington, DC: Gryphon House (Simpson, 1972).*
- Affective Domain: Taxonomy of educational objectives: Handbook II: The Affective Domain. New York: McKay (Krathwohl et al, 1964).*

COURSE INFORMATION

COURSE INFORMATION

- Format adalah adaptasi daripada COPPA 2.0 – *Table 4*.
- Terdapat 15 item

Item 1 – Kod dan Nama Kursus	Item 9 – <i>Transferable Skill</i>
Item 2 – Sinopsis Kursus	Item 10 – <i>Student Learning Time (SLT)</i>
Item 3 – Nama Pensyarah	Item 11 – <i>Special requirement to deliver the course</i>
Item 4 – Semester dan tahun ditawarkan	Item 12 – Bahan rujukan
Item 5 – Nilai kredit	Item 13 – <i>Other additional information</i>
Item 6 – pra syarat	Item 14 – Silibus
Item 7 – Course Learning Outcome (CLO)	Item 15 - <i>Assessment</i>
Item 8 – Pemetaan CLO vs PLO, <i>teaching method & assessment</i>	

ITEM 1 – KOD DAN NAMA KURSUS

ITEM 2 – SINOPSIS KURSUS

ITEM 3 – NAMA PENSAYARAH

ITEM 4 – SEMESTER DAN TAHUN DITAWARKAN

ITEM 5 – NILAI KREDIT

ITEM 6 – PRA SYARAT

ITEM 7 – COURSE LEARNING OUTCOME (CLO)

COURSE INFORMATION

RESTRICTED

DEJ10013 Basic Control System

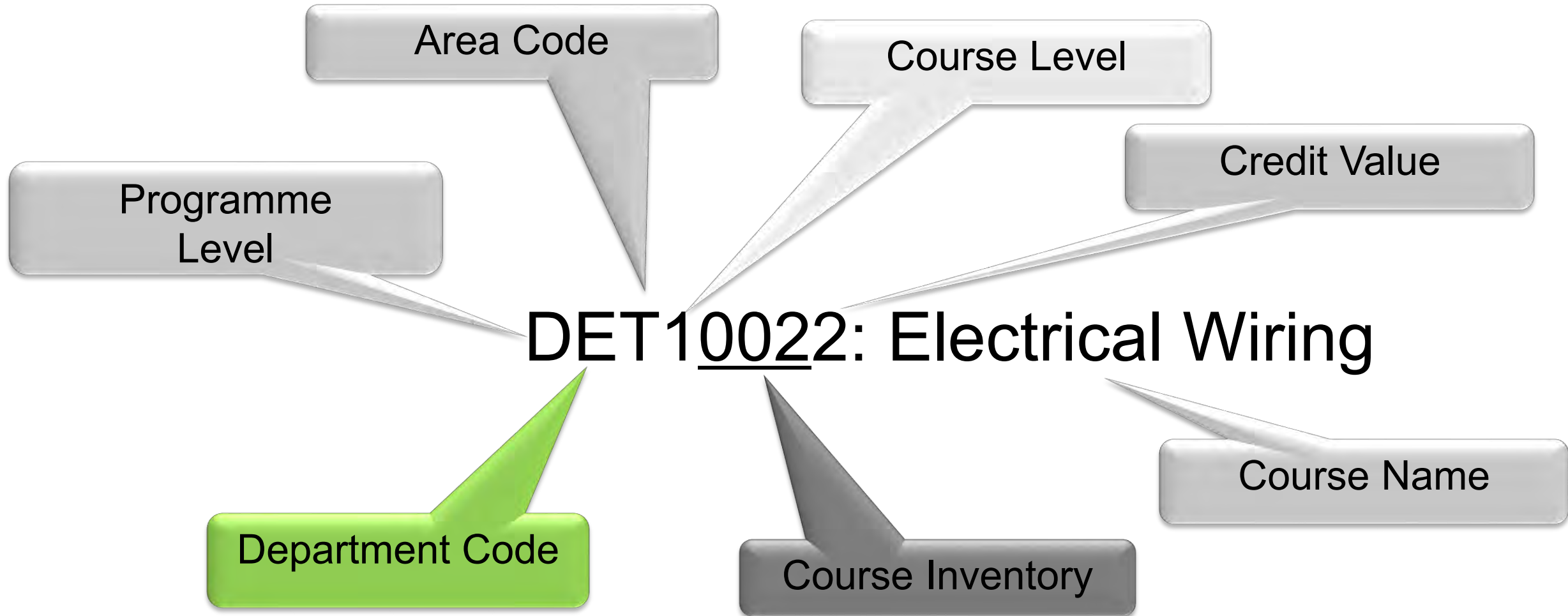
COURSE INFORMATION	
 DEPARTMENT OF POLYTECHNIC AND COMMUNITY COLLEGE EDUCATION, MINISTRY OF EDUCATION MALAYSIA	
1	NAME OF COURSE : BASIC CONTROL SYSTEM COURSE CODE : DEJ30013
2	SYNOPSIS: BASIC CONTROL SYSTEM introduces students to the fundamental ideas of classical control theory such as the basic concept of control system, transfer function and time domain analysis. Student will also be introduced to the concept of controller in control system. The goal is to instill the students' interests in the fields of control system and to provide a solid background for engineering applications in control system techniques
3	NAME(S) OF ACADEMIC STAFF :
4	SEMESTER AND YEAR OFFERED :
5	CREDIT VALUE : 3
6	PREREQUISITE/CO-REQUISITE (IF ANY) : None
7	COURSE LEARNING OUTCOMES (CLO): Upon completion of this course, students should be able to: CLO1 : apply the concept and principles of control system fundamental in various type of control system engineering applications (CS , PLO 1) CLO2 : display an ability to handle control systems equipment using proper techniques and procedures (P3 , PLO 5) CLO3 : demonstrate effectively as a part of team while doing practical work based on related procedures (A3 , PLO 9)

Kod dan Nama Kursus

- Nama kursus ditetapkan untuk menyatakan kursus yang ditawarkan dan membezakan di antara satu kursus dengan kursus yang lain.
- Setiap kod kursus didaftarkan di dalam inventori kurikulum

KOD KURSUS

COURSE INFORMATION



CREDIT VALUE

COURSE INFORMATION

RESTRICTED

DEJ30013 Basic Control System

COURSE INFORMATION	
	DEPARTMENT OF POLYTECHNIC AND COMMUNITY COLLEGE EDUCATION, MINISTRY OF EDUCATION MALAYSIA
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2	SYNOPSIS: BASIC CONTROL SYSTEM introduces students to the fundamental ideas of classical control theory such as the basic concept of control system, transfer function and time domain analysis. Student will also be introduced to the concept of controller in control system. The goal is to instill the students' interests in the fields of control system and to provide a solid background for engineering applications in control system techniques
3	NAME(S) OF ACADEMIC STAFF :
4	SEMESTER AND YEAR OFFERED :
5	CREDIT VALUE : 3
6	PREREQUISITE/CO-REQUISITE (IF ANY) : None
7	COURSE LEARNING OUTCOMES (CLO): Upon completion of this course, students should be able to: CLO1 : apply the concept and principles of control system fundamental in various type of control system engineering applications (C3 , PLO 1) CLO2 : display an ability to handle control system equipment using proper techniques and procedures (P3 , PLO 5) CLO3 : demonstrate effectively as a part of team while doing practical work based on related procedures (A3 , PLO 9)

Kredit

- Setiap kursus diberi nilai kredit berdasarkan standard MQF : 1 kredit bersamaan 40 jam pembelajaran.
- Nilai Kredit memberi panduan sejauh mana beban kerja pelajar dalam kursus yang berkenaan.

PRE REQUISITE / CO-REQUISITE

COURSE INFORMATION

RESTRICTED

DEJ30013 Basic Control System

COURSE INFORMATION	
	
DEPARTMENT OF POLYTECHNIC AND COMMUNITY COLLEGE EDUCATION, MINISTRY OF EDUCATION MALAYSIA	
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3	NAME(S) OF ACADEMIC STAFF :
4	SEMESTER AND YEAR OFFERED :
5	CREDIT VALUE : 3
6	PREREQUISITE/CO-REQUISITE (IF ANY) : None
7	COURSE LEARNING OUTCOMES (CLO): Upon completion of this course, students should be able to: CLO1 : apply the concept and principles of control system fundamental in various type of control system engineering applications (C3 , FLO 1) CLO2 : display an ability to handle control system equipment using proper techniques and procedures (P3 , FLO 5) CLO3 : demonstrate effectively as a part of team while doing practical work based on related procedures (A3 , FLO 9)

Pra Syarat

★ Syarat yg mesti dipenuhi sebelum membolehkan sesuatu kursus seterusnya diambil.

COURSE LEARNING OUTCOME (CLO)

RESTRICTED

DEJ30013 Basic Control System

COURSE INFORMATION

COURSE INFORMATION	
	DEPARTMENT OF POLYTECHNIC AND COMMUNITY COLLEGE EDUCATION, MINISTRY OF EDUCATION MALAYSIA
1	NAME OF COURSE : BASIC CONTROL SYSTEM COURSE CODE : DEJ30013
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3	NAME(S) OF ACADEMIC STAFF :
4	SEMESTER AND YEAR OFFERED :
5	CREDIT VALUE : 3
6	PREREQUISITE/CO-REQUISITE (IF ANY) : None
7	COURSE LEARNING OUTCOMES (CLO): Upon completion of this course, students should be able to: CLO1 : apply the concept and principles of control system fundamental in various type of control system engineering applications (C3 , PLO 1) CLO2 : display an ability to handle control system equipment using proper techniques and procedures (P3 , PLO 5) CLO3 : demonstrate effectively as a part of team while doing practical work based on related procedures (A3 , PLO 9)

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

CLO1 : apply the concept and principles of control system fundamental in various type of control system engineering applications (C3 , PLO 1)

CLO2 : display an ability to handle control system equipment using proper techniques and procedures (P3 , PLO 5)

CLO3 : demonstrate effectively as a part of team while doing practical work based on related procedures (A3 , PLO 9)

Tahap
Domain Taksonomi (DT)

PLO

OUTCOME BASED EDUCATION (OBE)

COURSE INFORMATION

- Fokus pada outcomes (CLO) dan bukannya sekadar mengajar topik-topik dalam kursus.
- Topik-topik dalam kursus adalah untuk menyokong outcomes (CLO) kursus tersebut.

4 PRINSIP OBE

COURSE INFORMATION

1 Kejelasan Fokus

Pensyarah mesti jelas terhadap apa yang mereka hendak pelajar tahu, fahami dan mampu laksanakan/tunjukkan untuk mencapai hasil pembelajaran.

3 Jangkaan Tinggi

Pensyarah perlu mewujudkan tahap prestasi yang tinggi lagi mencabar kepada pelajar untuk menggalakkan mereka terlibat secara mendalam dalam sesi pembelajaran.

2 Rekabentuk menurun

Rekabentuk kurikulum mesti bermula dengan mendefinisikan hasil pembelajaran dengan jelas yang perlu dicapai oleh pelajar di akhir program.

4 Peluang Diperluaskan

Menyediakan pelbagai peluang pembelajaran yang menepati keperluan dan teknik pelajaran pelajar. Tidak semua pelajar dapat pelajari perkara yang sama dengan cara yang sama pada masa yang sama.

ITEM 8- MAPPING CLO VS PLO, TEACHING METHODS AND ASSESSMENT INFORMATION

CLO vs PLO

COURSE INFORMATION

SEJAJAR

		Programme Learning Outcomes (PLO)												Teaching Methods	Assessment Methods
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	Course Learning Outcomes (CLO)														
CLO1	Apply the concept of electronic communication system by using appropriate diagram and standard formula (C3 , PLO 1)	/												Interactive Lecture and Discussion	Quiz
															Test
															End Of Chapter
															Final Examination
CLO2	Assemble the related communication equipment systematically in performing the measurement of appropriate signals parameter (P4 , PLO 5)					/								Practical Work Activity	Practical Work
															Practical Test
CLO3	Demonstrate the ability to work in a team to complete the assigned tasks during practical work sessions (A3 , PLO 9)									/				Practical Work Activity	Practical Work

CLO vs PLO

COURSE INFORMATION

SEJAJAR

Kursus: DET10022 ELECTRICAL WIRING

8

MAPPING OF THE COURSE LEARNING OUTCOMES TO THE PROGRAMME LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT:

	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)												Teaching Methods	Assessment Methods
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
CLO1	Apply the concept and principle of electrical safety and regulation in performing electrical wiring according to NIOSH, MS IEC 60364 standard. (C3 , PLO 1)	/												Interactive Lecture	Quiz
CLO2	Construct single phase domestic wiring according to MS IEC 60364 (P4 , PLO 5)					/								Laboratory Activity	Practical Work
														Laboratory Activity	Practical Test
														Mini Project	Mini Project
CLO3	Demonstrate an understanding and commit to professional ethics and responsibilities of engineering norms and sustainable energy practices in electrical wiring during performing single phase domestic wiring task. (A3 , PLO 8)								/					Laboratory Activity	Practical Work

ITEM 9 - TRANSFERABLE SKILLS

TRANSFERABLE SKILLS

COURSE INFORMATION

Kursus: DET10022 ELECTRICAL WIRING

Kemahiran dan kebolehan teras yang merangkumi 3 domain pembelajaran iaitu kognitif, psikomotor dan efektif yang dicapai di akhir pembelajaran sesuatu kursus.

9	TRANSFERABLE SKILLS: a. Knowledge b. Modern Tool Usage c. Ethics
---	---



PROGRAMME LEARNING OUTCOME (PLO)											
PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
Knowledge	Problem Analysis	Design/Development of Solutions	Investigation	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Teamwork	Communications	Project Management and Finance	Life Long Learning

7	COURSE LEARNING OUTCOMES (CLO): Upon completion of this course, students should be able to: Apply the concept and principle of electrical safety and regulation in	
CLO1 : performing electrical wiring according to NIOSH, MS IEC 60364 standard.	(C3 , PLO 1)	
CLO2 : Construct single phase domestic wiring according to MS IEC 60364	(P4 , PLO 5)	
Demonstrate an understanding and commit to professional ethics and		
CLO3 : responsibilities of engineering norms and sustainable energy practices in electrical wiring during performing single phase domestic wiring task.	(A3 , PLO 8)	

ITEM 10 - STUDENT LEARNING TIME (SLT)

STUDENT LEARNING TIME (SLT)

COURSE INFORMATION

SLT adalah jumlah masa yang diperlukan untuk mempelajari sesuatu kursus yang terdiri daripada Jam Pertemuan Bersemuka, Jam Pertemuan Tidak Bersemuka, Jam Pembelajaran Kendiri Dan Jam Penilaian Formal.

(Rujukan: MQF,2011, Zainai Mohamed, 2006)

SATU (1) jam kredit adalah bersamaan dengan **40 JAM** pembelajaran nosional

STUDENT LEARNING TIME (SLT)

COURSE INFORMATION

SLT

```
graph TD; SLT[SLT] --> Dependent["Jam Pembelajaran Berpandu (Dependent Learning)"]; SLT --> Independent["Jam Pembelajaran Kendiri (Independent Learning)"]; SLT --> Formal["Jam Penilaian Formal (Formal Assessment)"]; Dependent --> F2F[F2F]; Dependent --> NF2F[NF2F];
```

Jam Pembelajaran Berpandu
(Dependent Learning)

F2F

NF2F

Jam Pembelajaran Kendiri
(Independent Learning)

Jam Penilaian Formal
(Formal Assessment)

TABURAN SLT

DEO30013 OPTICAL FUNDAMENTALS

TABURAN SLT

DEO30013 OPTICAL FUNDAMENTALS

Pengiraan SLT Kuliah (L)

- Jumlah jam **Kuliah (F2F)** bagi **Topik 1 = 6 jam**
- Jumlah jam **Pembelajaran Kendiri (NF2F) = 6 jam**
- Jumlah jam SLT bagi CLO 1 adalah = **12 jam** (F2F + NF2F)

10 DISTRIBUTION OF STUDENT LEARNING TIME (SLT):

		Teaching and Learning Activities						
		Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	SLT
Course Content Outline	CLO#	L	P	T	O			
1.0 NATURE OF LIGHT								
1.1 Understand the dual nature of light								
1.2 Remember Wave Theory as a nature of light								
1.3 Understand Wave Theory as a nature of light								
1.4 Apply wavelength formula in optical problem								
1.5 Remember Particle Theory as a nature of light								
1.6 Understand Particle Theory as a nature of light								
1.7 Apply the formulas in 1.6 to solve a photonic problem	1	6	0	0	0	0	6	12
1.8 Remember properties of light								
1.9 Understand properties of light								
1.10 Remember spectrum of light								
1.11 Remember source of light								
1.12 Understand source of light								
1.13 Apply blackbody radiator equation								
1.14 Remember Optic, Photonic and Optoelectronic.								

TABURAN SLT

DEO30013 OPTICAL FUNDAMENTALS

Pengiraan SLT Amali (P)

- Jumlah jam **Amali (F2F)** bagi **Topik 2 = 7 jam**
- Jumlah jam **Pembelajaran Kendiri (NF2F) = 3.5 jam**
- Jumlah jam SLT bagi CLO 2 adalah = **10.5 jam** (F2F + NF2F)

1.15 Apply blackbody radiator equation 1.14 Remember Optic, Photonic and Optoelectronic.								
2.0 GEOMETRICAL OPTICS 2.1 Remember light rays 2.2 Remember reflection of light 2.3 Apply Law of Reflection 2.4 Understand reflection of light on a plane mirror 2.5 Understand reflection of light on a curved mirror 2.6 Apply Ray Diagram technique to obtain the image characteristics of mirror 2.7 Apply curve mirror equations and sign convention table in mirror problems 2.8 Remember refraction of light 2.9 Understand refraction of light 2.10 Apply velocity, refractive index, critical angle and Snell's Law equations. 2.11 Understand dispersion of light	CLO1	7	0	0	0	0	7	14
	CLO2	0	7	0	0	0	3.5	10.5

TABURAN SLT

DEO30013 OPTICAL FUNDAMENTALS

Pengiraan SLT Afektif (L)

- Jumlah jam mendengar penerangan **Afektif (F2F)** bagi **Topik 5 = 0.5 jam**
- Jumlah jam **Pembelajaran Kendiri (NF2F) = 0.5 jam**
- Jumlah jam SLT bagi CLO 3 adalah = **1 jam** (F2F + NF2F)

Course Content Outline	CLO*	Teaching and Learning Activities						SLT
		Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	
		L	P	T	O			
4.0 WAVE OPTICS	CLO1	5	0	0	0	0	5	10
4.1 Remember the light wave								
4.2 Remember reflection and refraction of light wave								
4.3 Understand diffraction of light wave								
4.4 Understand interference of light wave								
4.5 Apply diffraction and interference formulas	CLO2	0	4	0	0	0	2	6
4.6 Understand polarization of light wave								
5.0 OPTICAL ABERRATIONS	CLO1	1.5	0	0	0	0	1.5	3
5.1 Remember optical aberrations	CLO3	0.5	0	0	0	0	0.5	1
5.2 Understand the optical aberrations								
TOTAL								19

TABURAN SLT

DEO30013 OPTICAL FUNDAMENTALS

Pengiraan SLT Continous Assessment (CA)

- Jumlah jam untuk menjawab **2 Quiz**
(F2F) = **1 jam**
- Jumlah jam **Pembelajaran Kendiri**
(NF2F) = **2 jam**
- Jumlah jam SLT bagi **penilaian Quiz**
adalah = **3 jam**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Quiz	5	1	2	3
Test	10	1	2	3

Pengiraan SLT Continous Assessment (CA)

Jumlah jam penilaian **2 Rubric Generic**

Skills (2 kali Presentation) (F2F)

= **4 jam**

Jumlah jam **Pembelajaran Kendiri**

(NF2F) = **4 jam**

Jumlah jam SLT bagi **penilaian Rubric**

Generic Skills adalah = **8 jam**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Quiz	5	1	2	3
Test	10	1	2	3
Practical Work	25	4	2	6
Practical Test	5	2	1	3
End of Chapter (Generic Skills)	5	4	4	8
End of Chapter	10	6	10	10

TABURAN SLT

DEO30013 OPTICAL FUNDAMENTALS

Pengiraan SLT Final Assessment (FA)

- Jumlah jam untuk menjawab **FE** (F2F) = **2 jam**
- Jumlah jam **Pembelajaran Kendiri** (NF2F) = **6 jam**
- Jumlah jam SLT bagi **penilaian FE** adalah = **8 jam**

FINAL ASSESSMENT	PERCENTAGE	FE	NF2F	SLT
	(%)			
Final Examination	40	2	6	8
TOTAL:				8

**Please tick (✓) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using 2-weeks, 1 credit formula

☐

GRAND TOTAL SLT: 120

L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face

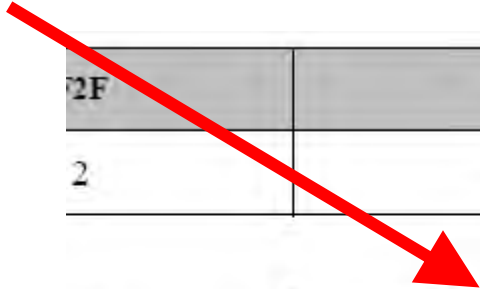
*Indicate the CLO based on the CLO's numbering in Item 8.

TABURAN SLT

DEO30013 OPTICAL FUNDAMENTALS

Pengiraan SLT Pelajar bagi Kursus DEO30013

- Jumlah SLT = SLT PdP + SLT CA + SLT FA = 79 + 33 + 8 = 120 jam
- 1 Jam kredit = 40 jam pembelajaran nosional @ SLT
- Jumlah Kredit = 120 jam / 40 jam = **3 kredit**



2F	NF2F	SLT
2	6	8
TOTAL:		8

nt/

NF2F=Non Face to Face

GRAND TOTAL SLT: 120

TABURAN SLT

DEO30013 OPTICAL FUNDAMENTALS

10 DISTRIBUTION OF STUDENT LEARNING TIME (SLT)

Course Content Outline	CLO ^a	Teaching Time (Hours)	
		L	P
1.0 NATURE OF LIGHT 1.1 Understand the dual nature of light 1.2 Remember Wave Theory as a nature of light 1.3 Understand Wave Theory as a nature of light 1.4 Apply wavelength formula in optical problem 1.5 Remember Particle Theory as a nature of light 1.6 Understand Particle Theory as a nature of light 1.7 Apply the formulas in 1.6 to solve a photonic problem 1.8 Remember properties of light 1.9 Understand properties of light 1.10 Remember spectrum of light 1.11 Remember source of light 1.12 Understand source of light 1.13 Apply blackbody radiator equation 1.14 Remember Optic, Photonic and Optoelectronic.	CLO1	6	0
2.0 GEOMETRICAL OPTICS 2.1 Remember light rays 2.2 Remember reflection of light 2.3 Apply Law of Reflection 2.4 Understand reflection of light on a plane mirror 2.5 Understand reflection of light on a curved mirror 2.6 Apply Ray Diagram technique to obtain the image characteristics of mirror 2.7 Apply curve mirror equations and sign convention table in mirror problems 2.8 Remember refraction of light 2.9 Understand refraction of light 2.10 Apply velocity, refractive index, critical angle and Snell's Law equations. 2.11 Understand dispersion of light	CLO1	7	0
	CLO2	0	7
3.0 SYSTEM OF LENSES 3.1 Remember the system of lenses 3.2 Understand system of lenses 3.3 Apply Ray Diagram technique to obtain the image characteristics of lenses 3.4 Apply equations and lens sign convention table in lenses problems 3.5 Understand optical instruments using lens 3.6 Apply magnification equations	CLO1	6	0
	CLO2	0	7

Lecture + CA = 28 hours/14 week

Practical + CA = 28 hours/14 week

Course Content Outline	CLO ^a	Teaching Time (Hours)	
		L	P
4.0 WAVE OPTICS 4.1 Remember the light wave 4.2 Remember reflection and refraction of light wave 4.3 Understand diffraction of light wave 4.4 Understand interference of light wave 4.5 Apply diffraction and interference formulas 4.6 Understand polarization of light wave	CLO1	5	0
	CLO2	0	4
5.0 OPTICAL ABERRATIONS 5.1 Remember optical aberrations 5.2 Understand the optical aberrations	CLO1	1.5	0
	CLO3	0.5	0

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F
Quiz	5	1
Test	10	1
Practical Work	25	4
Practical Test	5	2
End of Chapter (Generic Skills)	5	4
End of Chapter	10	0

TABURAN SLT

DEU40032 BIOMEDICAL SIGNAL MEASUREMENT

TABURAN SLT

DEU40032 BIOMEDICAL SIGNAL MEASUREMENT

Pengiraan SLT Kuliah (L)

- Jumlah jam **Kuliah (F2F)** bagi Topik 1 = **2 jam**
- Jumlah jam **Pembelajaran Kendiri (NF2F)** = **2 jam**
- Jumlah jam SLT bagi CLO 1 adalah = **4 jam** (F2F + NF2F)

Course Content Outline	CLO*	Teaching and Learning Activities						SLT
		Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	
		L	P	T	O			
1.0 THE ORIGIN OF BIOPOTENTIALS	CLO1	2	0	0	0	0	2	4
1.1 Remember bioelectric potentials								
1.2 Understand bioelectric potentials	CLO2	0	10	0	0	0	5	15
1.3 Apply the bioelectric potentials of human body	CLO3	0	1	0	0	0	0.5	1.5
2.0 BIOPOTENTIAL ELECTRODES								

TABURAN SLT

DEU40032 BIOMEDICAL SIGNAL MEASUREMENT

Pengiraan SLT Amali (P)

- Jumlah jam **Amali (F2F)** bagi Topik 1 = **10 jam**
- Jumlah jam **Pembelajaran Kendiri (NF2F)** = **5 jam**
- Jumlah jam SLT bagi CLO 2 adalah = **15 jam** (F2F + NF2F)

Course Content Outline	CLO*	Teaching and Learning Activities						SLT
		Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	
		L	P	T	O			
1.0 THE ORIGIN OF BIOPOTENTIALS	CLO1	2	0	0	0	0	2	4
1.1 Understand bioelectric potentials	CLO2	0	10	0	0	0	5	15
1.2 Understand bioelectric potentials	CLO2	0	10	0	0	0	5	15
1.3 Apply the bioelectric potentials of human body	CLO3	0	1	0	0	0	0.5	1.5
2.0 BIOPOTENTIAL ELECTRODES								

TABURAN SLT

DEU40032 BIOMEDICAL SIGNAL MEASUREMENT

Pengiraan SLT Afektif (P)

- Jumlah jam **Afektif (F2F)** bagi Topik 1 = **1 jam**
- Jumlah jam **Pembelajaran Kendiri (NF2F)** = **0.5 jam**
- Jumlah jam SLT bagi CLO 3 adalah = **1.5 jam** (F2F + NF2F)

Course Content Outline	CLO*	Teaching and Learning Activities						SLT
		Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	
		L	P	T	O			
1.0 THE ORIGIN OF BIOPOTENTIALS	CLO1	2	0	0	0	0	2	4
1.1 Remember bioelectric potentials	CLO2	0	10	0	0	0	5	15
1.2 Understand bioelectric potentials								
1.3 Apply the bioelectric potentials of human body	CLO3	0	1	0	0	0	0.5	1.5
2.0 BIOPOTENTIAL ELECTRODES								

TABURAN SLT

DEU40032 BIOMEDICAL SIGNAL MEASUREMENT

Pengiraan SLT Continous Assessment (CA)

- Jumlah jam untuk menjawab **2 Quiz**
(F2F) = **30 minit**
- Jumlah jam **Pembelajaran Kendiri**
(NF2F) = **1 jam**
- Jumlah jam SLT bagi **penilaian Quiz**
adalah = **1.5 jam**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Quiz	10	0.5	1	1.5
Test	20	1	2	3
Discretionary Work	50	8	4	12

TABURAN SLT

DEU40032 BIOMEDICAL SIGNAL MEASUREMENT

Pengiraan SLT Continous Assessment (CA)

Jumlah jam penilaian **2 Rubric Generic**

Skills (F2F)

= **1 jam**

Jumlah jam **Pembelajaran Kendiri**

(NF2F) = **0.5 jam**

Jumlah jam SLT bagi **penilaian Rubric**

Generic Skills adalah = **1.5 jam**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Quiz	10	0.5	1	1.5
Test	20	1	2	3
Practical Work	50	8	4	12
Practical work (Generic Skills)	5	1	0.5	1.5
End Of Chapter	15	0	8.5	8.5

TABURAN SLT

DEU40032 BIOMEDICAL SIGNAL MEASUREMENT

Pengiraan SLT Final Assessment (FA)

- Kursus TIADA Final Assessment

FINAL ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Final Examination	0	0	0	0
TOTAL:				0

**Please tick (✓) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using 2-weeks, 1 credit formula

☐

GRAND TOTAL SLT: 80

L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face

TABURAN SLT

DEU40032 BIOMEDICAL SIGNAL MEASUREMENT

Pengiraan SLT Pelajar bagi Kursus DEU40032

- SLT (Kuliah + Amali) + SLT Penilaian Berterusan + Peperiksaan Akhir = **Jumlah Keseluruhan SLT** =
 $53.5 + 26.5 + 0 = \mathbf{80 \text{ jam}}$
- Pengiraan Kredit Kursus adalah **1 jam kredit = 40 jam pembelajaran nosional / SLT**
- Jumlah Kredit bagi kursus ini bersamaan = 80 jam/
 $40 \text{ jam} = \mathbf{2 \text{ kredit}}$

	PERCENTAGE (%)	F2F	NF2F	SLT
	0	0	0	0
TOTAL:				0
Industry/ Clinical Placement/ Practicum/ WBL				
GRAND TOTAL SLT:				80

Legend: F2F=Face to Face, NF2F=Non Face to Face

TABURAN SLT

DEU40032 BIOMEDICAL SIGNAL MEASUREMENT

Course Content Outline	CLO*	L	P
1.0 THE ORIGIN OF BIOPOTENTIALS	CLO1	2	0
1.1 Remember bioelectric potentials			10
1.2 Understand bioelectric potentials	CLO2	0	1
1.3 Apply the bioelectric potentials of human body	CLO3	0	1
2.0 BIOPOTENTIAL ELECTRODES			
2.1 Remember biopotential electrodes	CLO1	2	0
2.2 Understand biopotential electrodes			
2.3 Understand biochemical transducers			
3.0 BIOPOTENTIAL AMPLIFIERS			
3.1 Remember basic biopotential amplifiers	CLO1	2.5	0
3.2 Remember special circuits			
3.3 Understand basic biopotential amplifiers	CLO2	0	1
3.4 Evaluate biopotential circuits			
3.5 Apply knowledge of basic biopotential amplifiers	CLO3	0	0.25
3.6 Analyze biopotential amplifier circuits operation			
4.0 CARDIOVASCULAR MEASUREMENT			
4.1 Remember Electrocardiography (ECG)	CLO1	4	0
4.2 Remember Blood Pressure Measurement			
4.3 Remember Blood Flow measurement and Cardiac Output			
4.4 Remember Heart Sound	CLO2	0	3
4.5 Evaluate Electrocardiography (ECG)			
4.6 Understand Blood Pressure Measurement			
4.7 Understand Blood Flow measurement and Cardiac Output			
4.8 Understand Heart Sound	CLO3	0	0.5
4.9 Measure Blood Pressure			
4.10 Measure Heart Sound			
4.11 Analyze normal and abnormal Heart Sound			

5.0 RESPIRATORY MEASUREMENT	CLO1	2	0
5.1 Remember Respiratory System			
5.2 Remember Lung Volume			
5.3 Understand Respiratory	CLO2	0	3
5.4 Understand Lung Volume			
5.5 Apply Respiratory System Measurement in order to measure respiration parameter			
5.6 Apply Lung Volume Measurement to get lung volume graphs	CLO3	0	0.25

Lecture + CA = 14 hours/14 week

Practical + CA = 28 hours/14 week

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F
Quiz	10	0.5
Test	20	1
Practical Work	50	8
Practical work (Generic Skills)	5	1

TABURAN SLT

DET10022 ELECTRICAL WIRING

TABURAN SLT

DET10022 ELECTRICAL WIRING

SLT Kuliah (L)

1 jam + 1 jam = 2 jam

SLT Amali (P)

18 jam

SLT Afektif (P)

1 jam

10 DISTRIBUTION OF STUDENT LEARNING TIME (SLT):

		Teaching and Learning Activities						
		Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	SLT
Course Content Outline	CLO*	L	P	T	O			
1.0 ELECTRICAL SAFETY								
1.1 Know electrical hazards								
1.2 Know dangers of electrical shocks								
1.3 Understand working environment safety								
1.4 Apply working practices safety								
2.0 ACCESSORIES AND TOOLS IN ELECTRICAL INSTALLATION								
2.1 Know the function and installation methods of the accessories for electrical installation.								
2.2 Understand the usage of electrical installation tools								
3.0 WIRING SYSTEM								
3.1 Know domestic electrical installation.								
3.2 Understand selection of cable sizes								
3.3 Apply consumer circuit in electrical installation								
3.4 Understand tariffs								
3.5 Apply sustainable energy practices								
4.0 WIRING PROTECTION								
4.1 Know over current and leakage current protection								
4.2 Understand types of fuses and circuit breakers								
4.3 Understand earthing								
4.4 Apply over current protection, fuses, circuit breaker and earthing in electrical installation								
5.0 INSPECTION AND TESTING								
5.1 Apply inspection and testing in electrical installation								

TOTAL: 58

TABURAN SLT

DET10022 ELECTRICAL WIRING

Pengiraan SLT Continous Assessment (CA)

Jumlah jam untuk menjawab **2 Quiz** (F2F)

= **1 jam**

Jumlah jam **Pembelajaran Kendiri** (NF2F)

= **1 jam**

Jumlah jam SLT bagi **penilaian Quiz** adalah

= **2 jam**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Quiz	10	1.0	1.0	2.0
Mini Project	20	3.0	3.0	6.0
Practical Test	15	3.0	3.0	6.0
Practical Work	50	3.0	3.0	6.0
Practical Work (Generic Skills)	5	1.0	1.0	2.0
				TOTAL: 22

FINAL ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
0	0	0	0	0
				TOTAL: 0

**Please tick (✓) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using 2-weeks, 1 credit formula

L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face

*Indicate the CLO based on the CLO's numbering in Item 8.

☐ GRAND TOTAL SLT: 80

TABURAN SLT

DET10022 ELECTRICAL WIRING

Pengiraan SLT Continous Assessment (CA)

Jumlah jam untuk penilaian **Practical Work**
(F2F) = **3 jam**

Jumlah jam **Pembelajaran Kendiri**
(NF2F) = **3 jam**

Jumlah jam SLT bagi **penilaian Practical Work** adalah = **6 jam**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Quiz	10	1.0	1.0	2.0
Mini Proje	20	3.0	3.0	6.0
Practical Test	15	3.0	3.0	6.0
Practical Work	50	3.0	3.0	6.0
Practical Work (Generic Skills)	5	1.0	1.0	2.0
TOTAL:				22

FINAL ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
0	0	0	0	0
TOTAL:				0

**Please tick (✓) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using 2-weeks, 1 credit formula
L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face

☐ GRAND TOTAL SLT: 80

*Indicate the CLO based on the CLO's numbering in Item 8.

TABURAN SLT

DET10022 ELECTRICAL WIRING

Cth Pengiraan SLT Final Assessment (FA)

- TIADA

Jumlah SLT Pelajar bagi Kursus DET10022

Jumlah SLT = SLT PdP + SLT CA + SLT FA

= 58 + 22 + 0

= 80 jam

1 Jam kredit = 40 jam pembelajaran nosional @ SLT

Jumlah Kredit = 80 jam/ 40 jam = **2 kredit**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Quiz	10	1.0	1.0	2.0
Mini Proje	20	3.0	3.0	6.0
Practical Test	15	3.0	3.0	6.0
Practical Work	50	3.0	3.0	6.0
Practical Work (Generic Skills)	5	1.0	1.0	2.0
				TOTAL: 22

FINAL ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
0	0	0	0	0
				TOTAL: 0

**Please tick (✓) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using 2-weeks, 1 credit formula
L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face

*Indicate the CLO based on the CLO's numbering in Item 8.

GRAND TOTAL SLT: 80

TABURAN SLT

DEE30071 ELECTRONIC COMPUTER AIDED DESIGN

TABURAN SLT

DEE30071 ELECTRONIC COMPUTER AIDED DESIGN

10 DISTRIBUTION OF STUDENT LEARNING TIME (SLT):

		Teaching and Learning Activities						
		Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	SLT
		L	P	T	O			
Course Content Outline	CLO ⁺							
1.0 Introduction to Electronic Circuit Simulation and Software Packages 1.1 Concept and fundamentals of electronic circuit simulation 1.2 Simulation principles and concepts 1.3 Electronic circuit simulation package 1.4 Steps to use electronic simulation package 1.5 Steps to generate schematic circuits	CLO1	0	1	0	0	0	0.47	1.47
2.0 Simulation of Analogue Circuits 2.1 Concept of circuit level simulation 2.2 DC analysis 2.3 DC Analysis 2.4 Simulation results 2.5 Transient analysis 2.6 Transient analysis to simulate analogue circuits 2.7 Amplifier circuits 2.8 AC analysis 2.9 AC Analysis to simulate analogue circuits 2.10 AC analysis simulation results	CLO1	0	1.5	0	0	0	0.705	2.205
	CLO2	0	9	0	0	0	4.23	13.23

SLT Amali (P)

- Jumlah jam **Amali (F2F)** bagi Topik 1 (CLO 1) = **1 jam**
- Jumlah jam **Pembelajaran Kendiri (NF2F)** = **flexible**
- Jumlah jam SLT bagi CLO 1 adalah = **1.47 jam** (F2F + NF2F)

TABURAN SLT

DEE30071 ELECTRONIC COMPUTER AIDED DESIGN

10 DISTRIBUTION OF STUDENT LEARNING TIME (SLT):

		Teaching and Learning Activities						
		Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	SLT
Course Content Outline	CLO ⁺	L	P	T	O			
1.0 Introduction to Electronic Circuit Simulation and Software Packages 1.1 Concept and fundamentals of electronic circuit simulation 1.2 Simulation principles and concepts 1.3 Electronic circuit simulation package 1.4 Steps to use electronic simulation package 1.5 Steps to generate schematic circuits	CLO1	0	1	0	0	0	0.47	1.47
2.0 Simulation of Analogue Circuits 2.1 Concept of circuit level simulation 2.2 DC analysis 2.3 DC Analysis 2.4 Simulation results 2.5 Transient analysis 2.6 Transient analysis to simulate analogue circuits 2.7 Amplifier circuits 2.8 AC analysis 2.9 AC Analysis to simulate analogue circuits 2.10 AC analysis simulation results	CLO1	0	1.5	0	0	0	0.705	2.205
	CLO2	0	9	0	0	0	4.23	13.23

SLT Amali (P)

- Jumlah jam **Amali (F2F)** bagi **Topik 2 (CLO 2) = 9 jam**
- Jumlah jam **Pembelajaran Kendiri (NF2F) = flexible**
- Jumlah jam SLT bagi CLO 2 adalah = **13.23 jam** (F2F + NF2F)

TABURAN SLT

DEE30071 ELECTRONIC COMPUTER AIDED DESIGN

Pengiraan SLT *Continuous Assessment* (CA)

Jumlah jam untuk penilaian **6 Rubric Practical Work** (F2F)

= **1 jam**

Jumlah jam **Pembelajaran Kendiri** (NF2F)

= **0.5 jam**

Jumlah jam SLT bagi **penilaian Rubric Practical Work** adalah

= **1.5 jam**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Practical Work	50	1	0.5	1.5
Practical End of Chapter	20	1	0	1
Practical Test	30	1	0.5	1.5

TABURAN SLT

DEE30071 ELECTRONIC COMPUTER AIDED DESIGN

Pengiraan SLT *Continuous Assessment (CA)*

Jumlah jam untuk penilaian **4 End Of Chapter** (F2F)

= **1 jam**

Jumlah jam **Pembelajaran Kendiri** (NF2F)

= **0 jam** kerana penilaian dijalankan di dalam makmal.

Jumlah jam SLT bagi **penilaian End Of Chapter** adalah

= **1 jam**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Practical Work	50	1	0.5	1.5
Practical End of Chapter	20	1	0	1
Practical Test	30	1	0.5	1.5

TABURAN SLT

DEE30071 ELECTRONIC COMPUTER AIDED DESIGN

Pengiraan SLT *Continuous Assessment* (CA)

Jumlah jam untuk penilaian **1 Practical Test**
(F2F)

= **1 jam**

Jumlah jam **Pembelajaran Kendiri** (NF2F)

= **0.5 jam**

Jumlah jam SLT bagi **penilaian Practical Test** adalah

= **1.5 jam**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Practical Work	50	1	0.5	1.5
Practical End of Chapter	20	1	0	1
Practical Test	30	1	0.5	1.5

TABURAN SLT

DEE30071 ELECTRONIC COMPUTER AIDED DESIGN

FINAL ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
0	0	0	0	0
TOTAL:				0

**Please tick (✓) if this course is Latihan Industri/ Clinical Placement/ Practicum/
WBL using 2-weeks, 1 credit formula

☐

GRAND TOTAL SLT: 40

L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face

*Indicate the CLO based on the CLO's numbering in Item 8.

Jumlah SLT Pelajar bagi Kursus DEE30071

Jumlah SLT = SLT PdP + SLT CA + SLT FA = 36 + 4 + 0 = **40 jam**

1 Jam kredit = 40 jam pembelajaran nosional @ SLT

Jumlah Kredit = 40 jam/ 40 jam = **1 kredit**

TABURAN SLT

DEE40082 PROJECT 1

TABURAN SLT

DEE40082 PROJECT 1

Pengiraan SLT Kuliah (L)

Jumlah SLT Topik 1 (CLO1)

= 1.5 jam + 1.5 jam = 3 jam

Jumlah SLT Topik 1 (CLO2)

= 1 jam + 1 jam = 2 jam

10 DISTRIBUTION OF STUDENT LEARNING TIME (SLT):								
Course Content Outline	CLO#	Teaching and Learning Activities					SLT	
		Guided Learning (F2F)		Guided Learning (NF2F) eg: e-Learning		Independent Learning (NF2F)		
		L	P	T	O			
1.0 Project Selection	CLO1	1.5	0	0	0	0	1.5	3
1.1 Understand the following concept in choosing a project								
1.2 Apply the project category	CLO2	1	0	0	0	0	1	2
2.0 Project Management								
2.1 Understand the concept of project management								
2.2 Understand project life cycle and its phases	CLO4	1.5	1	0	0	0	2	4.5
2.3 Understand Project control and monitoring								
2.4 Project planning and scheduling								
3.0 Proposal Preparation	CLO1	1	0	0	0	0	1	2
3.1 Investigate well-defined problem	CLO2	1	0	0	0	0	1	2
3.2 Produce Final Proposal	CLO4	0.5	0	0	0	0	0.5	1
	CLO5	1	1	0	0	0	1.5	3.5
	CLO6	1	1	0	0	0	1.5	3.5
	CLO7	1	1	0	0	0	1.5	3.5
4.0 Procedures to construct project	CLO2	1.5	3	0	0	0	3	7.5
4.1 Apply hardware based project								
4.2 Apply software based project								
4.3 Apply software-hardware interfacing project	CLO3	1	15	0	0	0	8.5	24.5
TOTAL:								57

TABURAN SLT

DEE40082 PROJECT 1

Pengiraan SLT Praktikal (P)

Jumlah SLT Topik 4 (CLO3)

$$= \underline{1 \text{ jam} + 15 \text{ jam} + 8.5 \text{ jam} = 24.5 \text{ jam}}$$

10 DISTRIBUTION OF STUDENT LEARNING TIME (SLT):								
Course Content Outline	CLO#	Teaching and Learning Activities						SLT
		Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	
		L	P	T	O			
1.0 Project Selection	CLO1	1.5	0	0	0	0	1.5	3
1.1 Understand the following concept in choosing a project								
1.2 Apply the project category	CLO2	1	0	0	0	0	1	2
2.0 Project Management								
2.1 Understand the concept of project management								
2.2 Understand project life cycle and its phases	CLO4	1.5	1	0	0	0	2	4.5
2.3 Understand Project control and monitoring								
2.4 Project planning and scheduling								
3.0 Proposal Preparation	CLO1	1	0	0	0	0	1	2
	CLO2	1	0	0	0	0	1	2
3.1 Investigate well-defined problem	CLO4	0.5	0	0	0	0	0.5	1
3.2 Produce Final Proposal	CLO5	1	1	0	0	0	1.5	3.5
	CLO6	1	1	0	0	0	1.5	3.5
	CLO7	1	1	0	0	0	1.5	3.5
4.0 Procedures to construct project	CLO2	1.5	3	0	0	0	3	7.5
4.1 Apply hardware based project								
4.2 Apply software based project								
4.3 Apply software-hardware interfacing project	CLO3	1	15	0	0	0	8.5	24.5
TOTAL:								57

TABURAN SLT

DEE40082 PROJECT 1

Pengiraan SLT Afektif (L)

Jumlah SLT Topik 3 (CLO5)

$$= \underline{1 \text{ jam} + 1 \text{ jam} + 1.5 \text{ jam} = 3.5 \text{ jam}}$$

10 DISTRIBUTION OF STUDENT LEARNING TIME (SLT):								
Course Content Outline	CLO#	Teaching and Learning Activities						SLT
		Guided Learning (F2F)				Guided Learning (NF2F) eg: e-Learning	Independent Learning (NF2F)	
		L	P	T	O			
1.0 Project Selection	CLO1	1.5	0	0	0	0	1.5	3
1.1 Understand the following concept in choosing a project								
1.2 Apply the project category	CLO2	1	0	0	0	0	1	2
2.0 Project Management								
2.1 Understand the concept of project management								
2.2 Understand project life cycle and its phases								
2.3 Understand Project control and monitoring								
2.4 Project planning and scheduling	CLO4	1.5	1	0	0	0	2	4.5
3.0 Proposal Preparation	CLO1	1	0	0	0	0	1	2
	CLO2	1	0	0	0	0	1	2
3.1 Investigate well-defined problem	CLO4	0.5	0	0	0	0	0.5	1
3.2 Produce Final Proposal	CLO5	1	1	0	0	0	1.5	3.5
	CLO6	1	1	0	0	0	1.5	3.5
	CLO7	1	1	0	0	0	1.5	3.5
4.0 Procedures to construct project								
4.1 Apply hardware based project	CLO2	1.5	3	0	0	0	3	7.5
4.2 Apply software based project								
4.3 Apply software-hardware interfacing project	CLO3	1	15	0	0	0	8.5	24.5
TOTAL:								57

TABURAN SLT

DEE40082 PROJECT 1

Pengiraan SLT Continuous Assessment (CA)

Jumlah jam untuk menyediakan **2 Investigation Report** (F2F)

= **2 jam**

Jumlah jam **Pembelajaran Kendiri** (NF2F)

= **3 jam**

Jumlah jam SLT bagi **penyediaan 1 Investigation Report** adalah

= **5 jam**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Investigation Report	25	2	3	5
Logbook	35	2	4	6
Final Proposal	40	4	8	12
TOTAL:				23

FINAL ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
0	0	0	0	0
TOTAL:				0

GRAND TOTAL SLT: 80

**Please tick (✓) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using 2-weeks, 1 credit formula

L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face

*Indicate the CLO based on the CLO's numbering in Item 8.

TABURAN SLT

DEE40082 PROJECT 1

Jumlah SLT Pelajar bagi Kursus DEE40082

Jumlah SLT = SLT PdP + SLT CA + SLT FA =
57 + 23 + 0
= **80 jam**

1 Jam kredit = 40 jam pembelajaran nosional
@ SLT

Jumlah Kredit = 80 jam/ 40 jam = **2 kredit**

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Investigation Report	25	2	3	5
Logbook	35	2	4	6
Final Proposal	40	4	8	12
TOTAL:				23

FINAL ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
0	0	0	0	0
TOTAL:				0

GRAND TOTAL SLT: 80

**Please tick (✓) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using 2-weeks, 1 credit formula

L = Lecture, T = Tutorial, P= Practical, O= Others, F2F=Face to Face, NF2F=Non Face to Face

*Indicate the CLO based on the CLO's numbering in Item 8.

TABURAN SLT

DEE40082 PROJECT 1

Jumlah SLT Pelajar bagi Kursus DEE40082

$$\begin{aligned}\text{Jumlah SLT} &= \text{SLT PdP} + \text{SLT CA} + \text{SLT FA} = \\ &57 + 23 + 0 \\ &= \underline{\underline{80 \text{ jam}}}\end{aligned}$$

1 Jam kredit = 40 jam pembelajaran nosional
@ SLT

$$\text{Jumlah Kredit} = 80 \text{ jam} / 40 \text{ jam} = \mathbf{2 \text{ kredit}}$$

CONTINUOUS ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
Investigation Report	25	2	3	5
Logbook	35	2	4	6
Final Proposal	40	4	8	12
TOTAL:				23

FINAL ASSESSMENT	PERCENTAGE (%)	F2F	NF2F	SLT
0	0	0	0	0
TOTAL:				0

GRAND TOTAL SLT: 80

**Please tick (✓) if this course is Latihan Industri/ Clinical Placement/ Practicum/ WBL using 2-weeks, 1 credit formula

L = Lecture, T = Tutorial, P = Practical, O = Others, F2F = Face to Face, NF2F = Non Face to Face

*Indicate the CLO based on the CLO's numbering in Item 8.

ITEM 11 - SPECIAL REQUIREMENT TO DELIVER THE COURSE

SPECIAL REQUIREMENT TO DELIVER THE COURSE

Kursus: DEE30061 Computer Aided Electrical Drawing

11	SPECIAL REQUIREMENT OR RESOURCES TO DELIVER THE COURSE: a. Computers b. AutoCAD software
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Kursus: DEE40082 Project 1

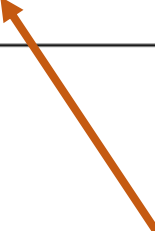
11	SPECIAL REQUIREMENT OR RESOURCES TO DELIVER THE COURSE: a. Computer b. PCB design software c. Project hardware construction tools and equipment
----	---

PCB design Software yang digunakan
adalah bergantung kepada pemilihan
politeknik

- Semua kursus menyatakan keperluan dan sumber khas yang berkaitan dalam penyampaian setiap kursus.
- Keperluan khas tersebut termasuk peralatan, perkakasan, trainer kit, perisian dan lain-lain berkaitan.

SPECIAL REQUIREMENT TO DELIVER THE COURSE

11	SPECIAL REQUIREMENT OR RESOURCES TO DELIVER THE COURSE: None
----	--



Contoh peralatan asas elektrik seperti **oscilloscope, multimeter, Regulated DC power supply** dan lain-lain.

- **None** bermaksud tiada peralatan khas.
- Hanya menggunakan peralatan asas elektrik bergantung kepada keperluan politeknik masing-masing yang bersesuaian dengan kursus berkenaan.

ITEM 12 - BAHAN RUJUKAN

BAHAN RUJUKAN

Kursus: DEE30061 Computer Aided Electrical Drawing

12	REFERENCES: Main reference supporting the course Onstott, S. (2017). <i>AutoCAD 2017 and AutoCAD LT 2017 essentials</i>. United States. John Wiley & Sons Inc Additional references supporting the course Mohd. Fadzil Daud. & Khairul Anwar Hanafiah. (2010). <i>Panduan Asas Lukisan Kejuruteraan</i>. 2nd ed. Skudai, Johor Darul Ta'zim: Penerbit Universiti Teknologi Malaysia
----	---

- Format rujukan dibahagi kepada **dua bahagian** iaitu bahagian **utama** dan bahagian **tambahan**. Susunan rujukan adalah dalam senarai abjad bagi kedua-dua bahagian tersebut dan disusun mengikut format yang ditetapkan.
- **Utama** – Rujukan yang mesti diadakan di politeknik
- **Tambahan** – Rujukan sokongan

BAHAN RUJUKAN

Kursus: DEE30061 Computer Aided Electrical Drawing

12	REFERENCES: Main reference supporting the course Onstott, S. (2017). <i>AutoCAD 2017 and AutoCAD LT 2017 essentials</i>. United States. John Wiley & Sons Inc Additional references supporting the course Mohd. Fadzil Daud. & Khairul Anwar Hanaffah. (2010). <i>Panduan Asas Lukisan Kejuruteraan</i>. 2nd ed. Skudai, Johor Darul Ta'zim: Penerbit Universiti Teknologi Malaysia
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- Rujukan yang digunakan dalam silibus mesti dikenalpasti sumbernya dan menggunakan yang terkini **(5 tahun kebelakang).**

BAHAN RUJUKAN

Kursus: DEC40053 Embedded System Applications

12 REFERENCES:

Main reference supporting the course

Muhammad Ali Mazidi, Danny Causey & Rolin Mc Kinlay (2016).
PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18. Micro Digital Ed

Additional references supporting the course

Barry B. Brey (2008). *Applying PIC18 Microcontrollers: Architecture, Programming, and Interfacing using C and Assembly*. Pearson Prentice Hall

Bates, M. (2013). *Interfacing PIC Microcontrollers Embedded Design by Interactive Simulation*. 2nd Edition. Newnes.

Bates, M. (2008). *Programming 8-bit PIC Microcontroller In C: With Interactive Hardware Simulation*. Newnes.

BAHAN RUJUKAN

Kursus: DET10022 Electrical Wiring

12 REFERENCES:

Main reference supporting the course

M. A. (2015). *Asas Pendawaian Elektrik Domestik Satu Fasa*. . Kuala Lumpur, Malaysia: Nine Over Ten Dot Biz.

Additional references supporting the course

Kitcher, C. (2018). *Practical Guide to Inspection, Testing and Certification of Electrical Installations, 5th ed*. London, United Kingdom: Taylor & Francis Ltd.

Manan, M. N. (2010). *Pendawaian Elektrik Di Bangunan Kediaman – Panduan Berpandukan MSIEC 60364*. Kuala Lumpur, Malaysia: IBS Buku SDN. BHD. .

Mohd. Isa Idris, Ramli Harun. (2011). *Asas pendawaian*. Petaling Jaya, Malaysia: IBS Buku Sdn. Bhd.

ITEM 13 - OTHER ADDITIONAL INFORMATION

OTHER ADDITIONAL INFORMATION

13

OTHER ADDITIONAL INFORMATION:

GENERIC SKILLS

a. Communication

Attribute 1: Verbal Communication

Sub-Attribute 1:

- i. Clear delivery of ideas
- ii. Confident delivery of ideas
- iii. Effective and articulate delivery of ideas
- iv. Understand and respond to question
- v. Adapt delivery to audience

Reference: iCGPA Rubric Learning Outcomes Assessment Guide 2016

The generic skill(s) need to be assessed at least **TWO (2)** times.

01 Generic Skills.

02 Attribute.

03 Sub-Attribute.

OTHER ADDITIONAL INFORMATION



Reference: iCGPA Rubric Learning Outcomes Assessment Guide 2016

The generic skill(s) need to be assessed at least **TWO (2)** times.

4 Prinsip OBE

OTHER ADDITIONAL INFORMATION

Latar Belakang



Pelan Pembangunan Pendidikan
Malaysia 2015-2025 (Pendidikan Tinggi)
atau PPPM (PT) (Kementerian
Pendidikan Tinggi Malaysia, 2015)
dirangka berasaskan wawasan dan
aspirasi

OTHER ADDITIONAL INFORMATION

Generic Skills

13

OTHER ADDITIONAL INFORMATION:

GENERIC SKILLS

a. Communication

Attribute 1: Verbal Communication

Sub-Attribute 1:

- i. Clear delivery of ideas
- ii. Confident delivery of ideas
- iii. Effective and articulate delivery of ideas
- iv. Understand and respond to question
- v. Adapt delivery to audience

Reference: iCGPA Rubric Learning Outcomes Assessment Guide 2016

The generic skill(s) need to be assessed at least **TWO (2)** times.

Kemahiran individu yang
seimbang serta harmoni dari segi
intelekt, rohani, emosi dan fizikal

OTHER ADDITIONAL INFORMATION

Cluster

CLS1

Knowledge &
Understanding

CLS3c

Digital & Numeracy Skills

CLS2

Cognitive Skills

CLS3d

Leadership, Autonomy &
Responsibility

CLS3a

Practical Skills

CLS4

Personal & Entrepreneurial
Skills

CLS3b

Interpersonal &
Communication Skills

CLS5

Ethics & Professionalism

OTHER ADDITIONAL INFORMATION

Cluster

11 PROGRAMME STRUCTURE

CLASSIFICATION	COURSE CODE	COURSE NAME	CONTACT HOURS				CREDIT VALUES	PROGRAMME LEARNING OUTCOME (PLO)												PREREQUISITE / CO-REQUISITE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
			L	P	T	O		CLS1	Knowledge	PLO1	CLS2	Problem Analysis	PLO2	CLS2	Design/Development of Solutions	PLO3	CLS2	Investigation	PLO4		CLS3a	Modern Tool Usage	PLO5	CLS3b	The Engineer and Society	PLO6	CLS5	Environment and Sustainability	PLO7	CLS5	Ethics	PLO8	CLS3d	Individual and Teamwork	PLO9	CLS3b	Communications	PLO10	CLS4	Project Management and Finance	PLO11	CLS4	Life Long Learning	PLO12																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

OTHER ADDITIONAL INFORMATION

Cluster

CLS1

Knowledge & Understanding

PLO1: Knowledge

CLS2

Cognitive Skills

PLO2: Problem Analysis
PLO3: Design/Development
of solutions
PLO4: Investigation

CLS3a

Practical Skills

PLO5: Modern Tool Usage

CLS3b

Interpersonal & Communication
Skills

PLO6: The Engineer and Society
PLO10: Communications

CLS3c

Digital & Numeracy Skills

PLO5: Modern Tool Usage

CLS3d

Leadership, Autonomy &
Responsibility

PLO9: Individual and Teamwork

CLS4

Personal & Entrepreneurial
Skills

PLO11: Project Management
and Finance
PLO12: Life Long Learning

CLS5

Ethics & Professionalism

PLO7: Environment and
Sustainability
PLO8: Ethics

OTHER ADDITIONAL INFORMATION

PLO VS Domain KKM/MQF

PLO	DOMAIN KKM
PLO1: Knowledge	KKM1/MQF1: Pengetahuan
PLO2: Problem Analysis	KKM6/MQF6:Kemahiran Penyelesaian Masalah dan Kemahiran Saintifik
PLO3:Design/Development of solutions	KKM6/MQF6:Kemahiran Penyelesaian Masalah dan Kemahiran Saintifik
PLO4: Investigation	KKM6/MQF6:Kemahiran Penyelesaian Masalah dan Kemahiran Saintifik
PLO5: Modern Tool Usage	KKM2/MQF2: Kemahiran Psikomotor/Amali/Teknikal

OTHER ADDITIONAL INFORMATION

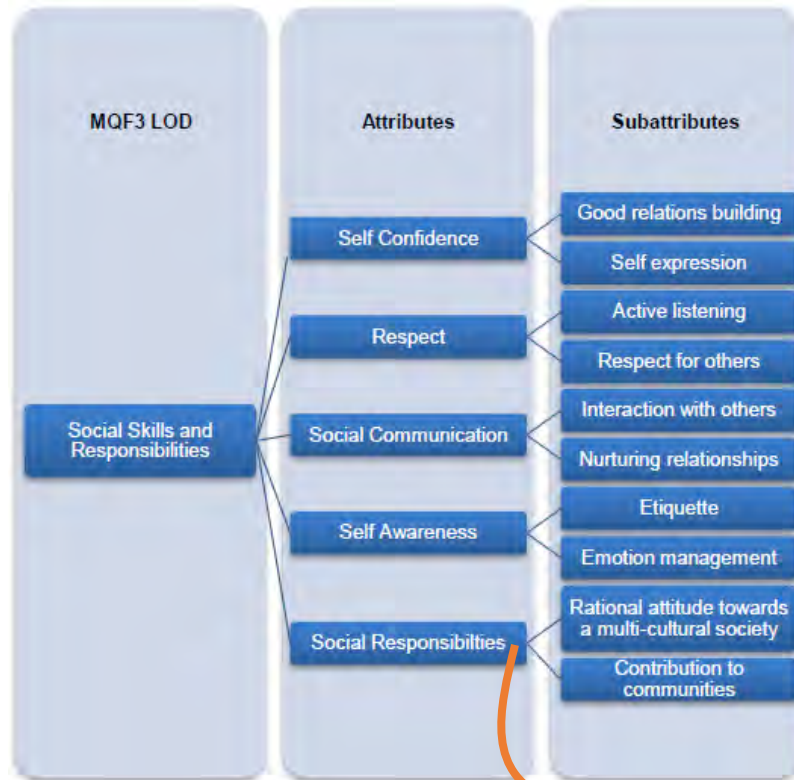
PLO VS Domain KKM/MQF

PLO	DOMAIN KKM
PLO6: The Engineer and Society	KKM3/MQF3: Kemahiran dan Tanggungjawab Sosial
PLO7: Environment and Sustainability	KKM3/MQF3: Kemahiran dan Tanggungjawab Sosial
PLO8: Ethics	KKM4/MQF4: Nilai, Sikap dan Profesionalisma
PLO9: Individual and Teamwork	KKM5/MQF5: Kemahiran Komunikasi, Kepimpinan dan Kerja Berpasukan
PLO10: Communications	KKM5/MQF5: Kemahiran Komunikasi, Kepimpinan dan Kerja Berpasukan
PLO11: Project Management and Finance	KKM8/MQF8: Kemahiran Mengurus dan Keusahawanan
PLO12: Life Long Learning	KKM7/MQF7: Kemahiran Pengurusan Maklumat dan Pembelajaran sepanjang Hayat

OTHER ADDITIONAL INFORMATION

PLO VS Domain KKM/MQF

PLO	DOMAIN KKM
PLO7: Environment and Sustainability	KKM3/MQF3: Kemahiran dan Tanggungjawab Sosial



Sumber: Buku Rubrik iCGPA 2016

- vii. Environment and Sustainability: 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);

Engineering Technology Accreditation Council, BEM | 3

DK 7: Knowledge of issues and approaches in engineering technician practice: ethics, financial, cultural, environmental and sustainability impacts

Sumber: ETAC Standard 2019

Penambahan *Sub attribute*:
SUSTAINABILITY AND ENVIRONMENT FRIENDLY

GENERIC SKILLS

DEE40082 Project 1

GENERIC SKILLS

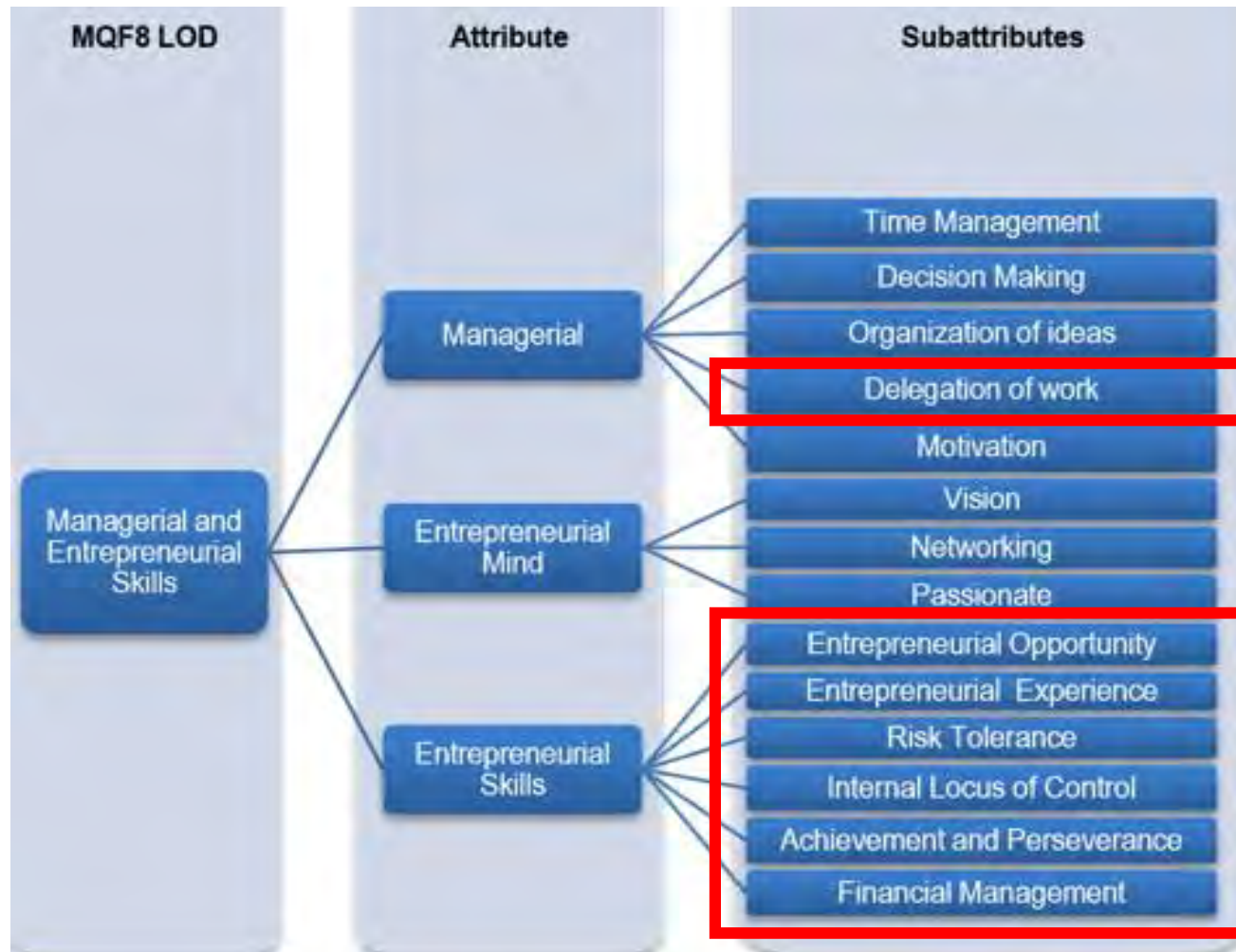
DEE40082 Project 1

		Programme Learning Outcomes (PLO)												Teaching Methods	Assessment Methods
	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
CLO4	Display good project management and finance through a Gantt Chart (milestone) and final proposal (A3 , PLO 11)											/		Discussion on Final Proposal Writing	Final Proposal
CLO5	Demonstrate information independent knowledge development final proposal CLO4 → PLO11 CLO5 → PLO12 CLO6 → PLO10 CLO7 → PLO6											/		Discussion on Project Task	Final Proposal
CLO6	Display written communication skill through a final proposal (A3 , PLO 10)										/			Report Writing	Final Proposal
CLO7	Describe the impact of the proposed project to the society in the final proposal (A3 , PLO 6)						/							Discussion	Final Proposal

MQF8 ATTRIBUTES & SUBATTRIBUTES

DEE40082 Project 1

Rujuk kepada iCGPA
Untuk rujukkan rubik
yang berkaitan



MQF8 ATTRIBUTES & SUBATTRIBUTES

DEE40082 Project 1 - CLO 4

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
1.0 Managerial	Time Management	No attempt to complete work on time. Not able to manage time.	Rarely completes work on time. Not able to manage time well.	Occasionally completes work on time. Tries to manage time	Completes work on time by taking advantage of the time provided and by using time management skills.	Completes tasks ahead of schedule by creating a plan and scheduling time to complete the work.
	Decision making	No attempt to make decision. Do not understand the situation and relate with options that are available.	Tries to make decision by understanding the situation. Decision made is based on limited understanding of the situation and available options.	Satisfactory attempts to make decisions and satisfactory understanding of the situation and available options.	Able to make a good decision based on good understanding of the situation and available options.	Able to make a very good decision based on excellent understanding of the situation and available options.
	Organization of ideas	Deliver ideas unclearly, loosely and disorganized.	Deliver ideas with minimal clarity, comprehensiveness and organization.	Deliver ideas with satisfactory clarity, comprehensiveness and organization.	Deliver ideas with good clarity, comprehensiveness and organization.	Deliver ideas with excellent clarity, comprehensiveness and organization.
	Delegation of work	Work was not divided equally. Only few members are doing the work while others are ignored.	Work was divided minimally amongst group members.	Work was divided satisfactorily amongst group members.	Work was divided well amongst group members.	Work was divided excellently amongst group members.

MQF8 ATTRIBUTES & SUBATTRIBUTES

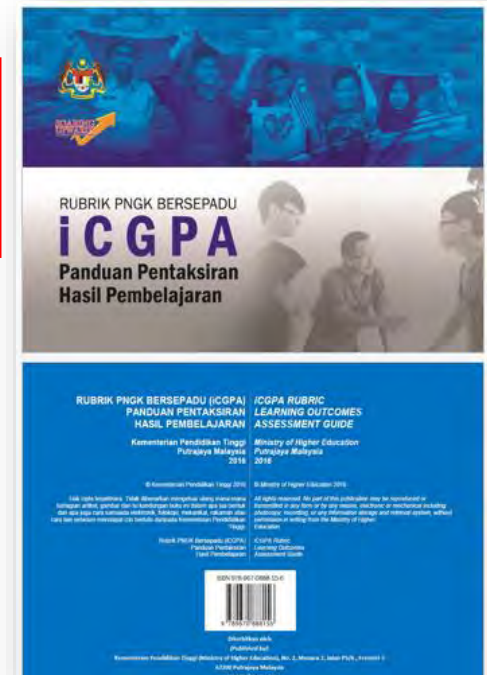
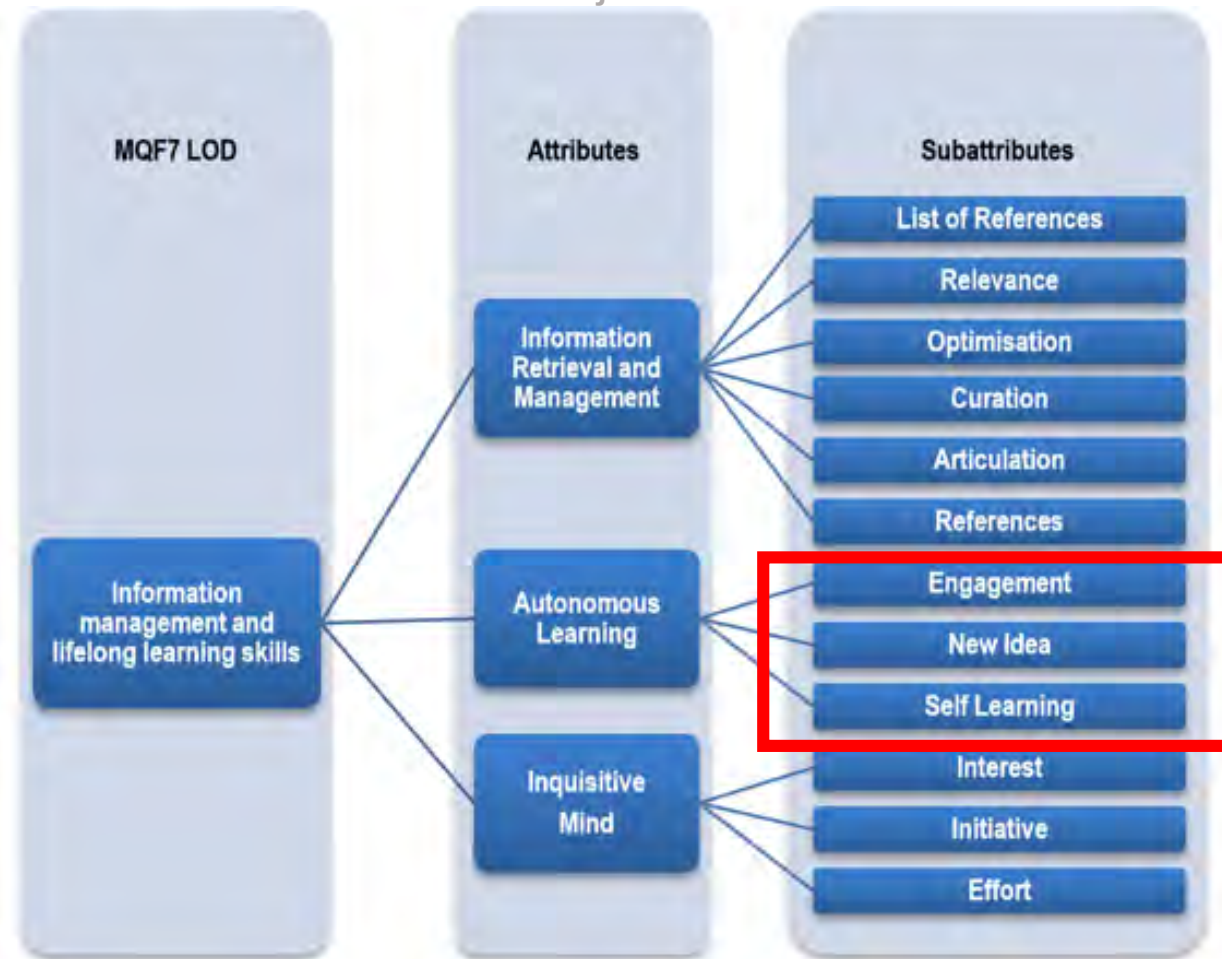
DEE40082 Project 1 - CLO 4

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
2.0 Entrepreneurial Skills	Entrepreneurial Opportunity	No entrepreneurial idea for value adding / solving customer needs	Has unclear entrepreneurial idea for value adding / solving customer needs and is not relevant to customer needs	Business idea is clear but does not fulfil the realistic customer needs	Business idea is clear and fulfils the customer needs	Able to mobilise the idea to become opportunity according to the business strategy and fulfils the customer needs
	Entrepreneurial Experience	Not able to write a reflection report for an entrepreneurial activity that she/he attends	Write a satisfactory reflection report for an entrepreneurial activity that she/he attends	Able to write a satisfactory reflection report for an entrepreneurial activity that she/he attends	Able to write a good reflection report for an entrepreneurial activity that she/he attends	Able to write an excellent reflection report for an entrepreneurial activity that she/he attends
	Risk Tolerance	Not able to identify risks	Able to identify risks	Able to get the information to reduce risks	Able to measure and analyse risks	Able to suggest alternatives to reduce risks
	Internal Locus of Control	Unable to take a stand and express entrepreneurial opinion / ideas	Dare to take a stand and express entrepreneurial opinion / ideas	Able to convince others with the entrepreneurial opinion / ideas	take an initiative to develop something from the entrepreneurial opinion / ideas	has the eagerness to influence others to develop a business network based on the entrepreneurial opinion / idea
	Achievement and Perseverance	Does not have a goal and no effort	Has unclear goal and effort	Has clear goal, but the goal is unrealistic	Has clear and realistic goal but easily achievable goal	Has clear, realistic and high goal
	Financial Management	Not able to identify basic financial components and sources	Able to identify basic financial components and sources	Able to analyse financial and sources	Able to retrieve financial information and costing	Able to develop a financial plan and costing

MQF7 ATTRIBUTES & SUBATTRIBUTES

DEE40082 Project 1

Rujuk kepada iCGPA
Untuk rujukkan rubik
yang berkaitan



MQF7 ATTRIBUTES & SUBATTRIBUTES

DEE40082 Project 1 - CLO 5

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
1.0 Information Retrieval and Management	List of References	Fail to fulfil the required number of references	Minimally fulfil the required number of references	Partially fulfil the required number of references	Fulfil the required number of references	Exceed the required number of references
	Relevance	No appropriateness and relevance of reference	Limited appropriateness and relevance of reference	Sufficient appropriateness and relevancy of reference	Good appropriateness and relevance of reference	Excellent appropriateness and relevance of reference
	Optimisation	Not able to retrieve information	Able to retrieve information from minimal references	Able to retrieve information from sufficient reference	Able to retrieve information from many references	Able to retrieve information from maximum references
	Curation	Not able to curate for required information	Limited curation for required information	Satisfactory curation for required information	Good curation for required information	Excellent curation for required information
	Articulation	Least articulation of references in writing	Low articulation of references in writing	Able to articulate the references in writing	Sufficiently able to articulate the references in writing	High ability to articulate references in writing
	References	Not able to use references	Limited use of the references	Appropriate use of references	Good use of the references	Excellent use of references

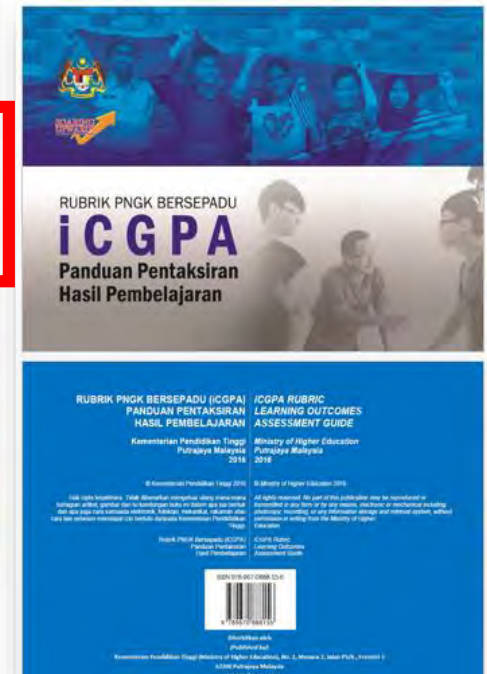
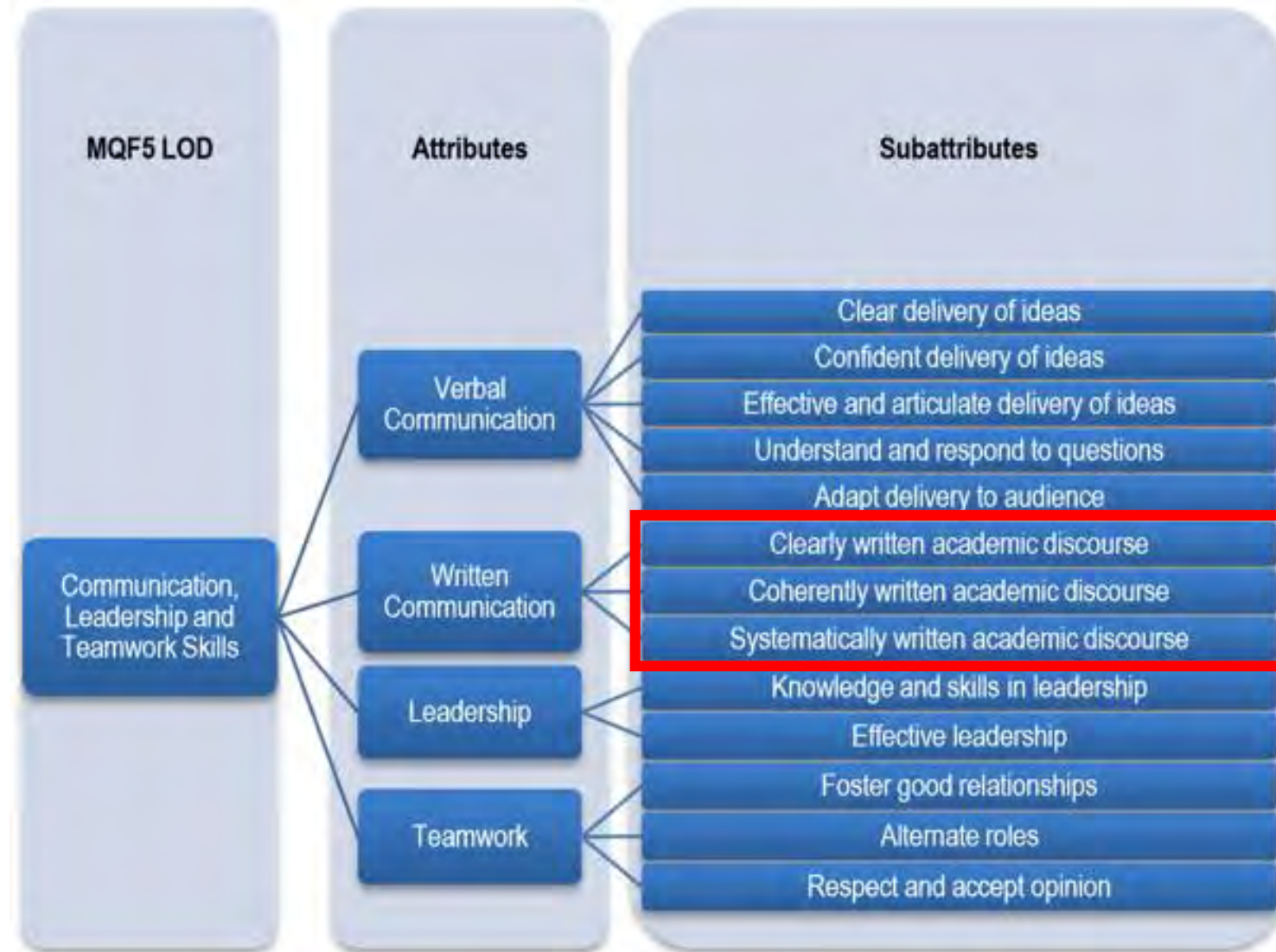
MQF7 ATTRIBUTES & SUBATTRIBUTES

DEE40082 Project 1

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
2.0 Autonomous Learning	Engagement	Least attempt to engage in autonomous learning	Minimally engage in autonomous learning	Putting effort to engage in autonomous learning	Consistently engage in autonomous learning	Highly engage in autonomous learning
	New Idea	No new idea to solve problems	Able to solve problems with weak new ideas	Able to solve problem with moderate new ideas	Able to solve problem with good new ideas	Able to solve problems with excellent new ideas
	Self Learning	Not able to self learn	Limited ability to self learn	Sufficient ability to self learn	Good ability to self learn	Excellent ability to self learn

MQF5 ATTRIBUTES & SUBATTRIBUTES

DEE40082 Project 1



MQF5 ATTRIBUTES & SUBATTRIBUTES

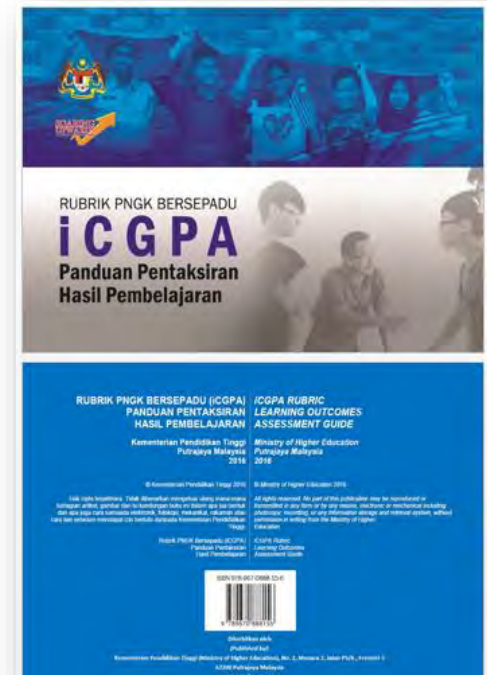
DEE40082 Project 1

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
Written Communication	Clearly written academic discourse	Not able to write ideas clearly	Able to write ideas with limited clarity and require further improvements	Able to write ideas fairly clearly but require minor improvements	Able to write ideas clearly	Able to write ideas with excellent clarity
	Coherently written academic discourse	Not able to write ideas coherently	Able to write ideas with limited coherence and require further improvements	Able to write ideas fairly coherently but require minor improvements	Able to write ideas coherently	Able to write ideas with excellent coherence
	Systematically written academic discourse	Not able to write ideas systematically	Able to write ideas with limited system and require further improvements	Able to write ideas fairly systematically but require minor improvements	Able to write ideas systematically	Excellent ability to write ideas systematically

MQF3 ATTRIBUTES & SUBATTRIBUTES

DEE40082 Project 1

Rujuk kepada iCGPA
Untuk rujukkan rubik
yang berkaitan



MQF3 ATTRIBUTES & SUBATTRIBUTES

DEE40082 Project 1 - CLO 7

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
Social Responsibility	Contribution to the society	Lack of initiative and is not interested to be engaged in the community	Take the initiative to be engaged in the community when requested	Satisfactorily responsible and taking initiative to be engaged in the community	1. Responsible and always take the initiative to be engaged in the community	1. Very responsible and always take the initiative to be engaged in the community
					2. Able to act as an agent of change (such as maintaining, improving, stabilizing moral values and norms) in the community	2. Able to play an active role as an agent of change (such as maintaining, improving, stabilizing moral values and norms) in the community
	Rational attitude towards a multicultural society	Not concern and can not give idea regarding the device/project application for the benefit community	Little concern and can not give idea regarding device/project application for the benefit community	Able to generate idea regarding the aplication of the device/project for the benefit of community with lecturer guidance	Able to generate idea regarding the aplication of the device/project for the benefit of community	Able to generate excellent idea regarding the application of the device/project for the benefit of community

ATTRIBUTES & SUBATTRIBUTES

DEE40082 Project 1

RUBRIK: SUSTAINABILITY AND ENVIRONMENT FRIENDLY

TIADA DALAM iCGPA

Attribute	Sub attribute	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
Social Responsibility	Sustainability and environment friendly	Not able to:	Poor ability to:	Satisfactory ability to:	Good ability to:	Excellent ability to:
		No usage of environment friendly, green materials/elements, reduce, recycled and reused concept that help to preserve the environment	Minimal usage of environment friendly, green materials/elements, reduce, recycled and reused concept that help to preserve the environment	Partly using environment friendly, green materials/elements, reduce, recycled and reused concept that help to preserve the environment	Mostly using environment friendly, green materials/elements, reduce, recycled and reused concept that help to preserve the environment	Total usage of environment friendly, green materials/elements, reduce, recycled and reused concept that help to preserve the environment
		Not able to:	Poor ability to:	Satisfactory ability to:	Good ability to:	Excellent ability to:
		No engagement with technology having green efficient to achieve energy efficient consumption that contributes to the sustainability of the environment	Minimal engagement with technology having green efficient to achieve energy efficient consumption that contributes to the sustainability of the environment	Partly engaged with technology having green efficient to achieve energy efficient consumption that contributes to the sustainability of the environment	Mostly engaged with technology having green efficient to achieve energy efficient consumption that contributes to the sustainability of the environment	Total engagement with technology having green efficient to achieve energy efficient consumption that contributes to the sustainability of the environment
		Not able to:	Poor ability to:	Satisfactory ability to:	Good ability to:	Excellent ability to:
		No usage of environment friendly, green materials/elements, reduce, recycled and reused concept that help to preserve the environment	Minimal usage of environment friendly, green materials/elements, reduce, recycled and reused concept that help to preserve the environment	Partly using environment friendly, green materials/elements, reduce, recycled and reused concept that help to preserve the environment	Mostly using environment friendly, green materials/elements, reduce, recycled and reused concept that help to preserve the environment	Total usage of environment friendly, green materials/elements, reduce, recycled and reused concept that help to preserve the environment
		Not able to:	Poor ability to:	Satisfactory ability to:	Good ability to:	Excellent ability to:
		No engagement with technology having green efficient to achieve energy efficient consumption that contributes to the sustainability of the environment	Minimal engagement with technology having green efficient to achieve energy efficient consumption that contributes to the sustainability of the environment	Partly engaged with technology having green efficient to achieve energy efficient consumption that contributes to the sustainability of the environment	Mostly engaged with technology having green efficient to achieve energy efficient consumption that contributes to the sustainability of the environment	Total engagement with technology having green efficient to achieve energy efficient consumption that contributes to the sustainability of the environment

GENERIC SKILLS

Rubric: Sustainability and Environment Friendly

GENERIC SKILLS

Rubric: Sustainability and Environment Friendly

d. The Engineering and Society

Attribute 1: Knowledge Profile, DK7

Reference: iCGPA Rubric Learning Outcomes Assessment Guide 2016

Engineering Technician Education Programme Accreditation Standard 2019

The generic skill(s) need to be assessed at least **TWO (2)** times.

DEE40082 Project 1

13 OTHER ADDITIONAL INFORMATION:

GENERIC SKILLS

a. Environmental and Sustainability

Attribute: Social Responsibility

Sub-Attribute:

i. Sustainability and Environment Friendly

DEP40053 Fiber Optic
Communication
System

GENERIC SKILLS

DUW10022 Occupational Safety and Health for Engineering

GENERIC SKILLS

DUW10022 Occupational Safety and Health for Engineering

		Programme Learning Outcomes (PO)												Teaching Methods	Assessment Methods
	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
CLO1	Explain briefly Occupational Safety and Health (OSH) procedures, regulation and its compliance in Malaysia. (C2 , PLO 1)	/												Interactive Learning	Quiz
														Interactive Learning	Theory Test
CLO2	Initiates incident hazards, risks and safe work practices in order to maintain health and safe work environment. (A3 , PLO 8)								/					Interactive Learning	Case Study 1
														Discussion	Case Study 2
CLO3	Forms communication skills in a team to respond for an accident action at workplace. (A3 , PLO 10)										/			Discussion	Presentation

CLO2 → PLO8
CLO3 → PLO10.



KKM4/MQF4 (iCGPA)
KKM5/MQF5 (iCGPA)

GENERIC SKILLS

DUW10022 Occupational Safety and Health for Engineering

9

TRANSFERABLE SKILLS:

- a. Knowledge
- b. Ethics
- c. Communication skills

01 Cognitive.

02 Generic Skills.

03 Generic Skills.

GENERIC SKILLS

DUW10022 Occupational Safety and Health for Engineering

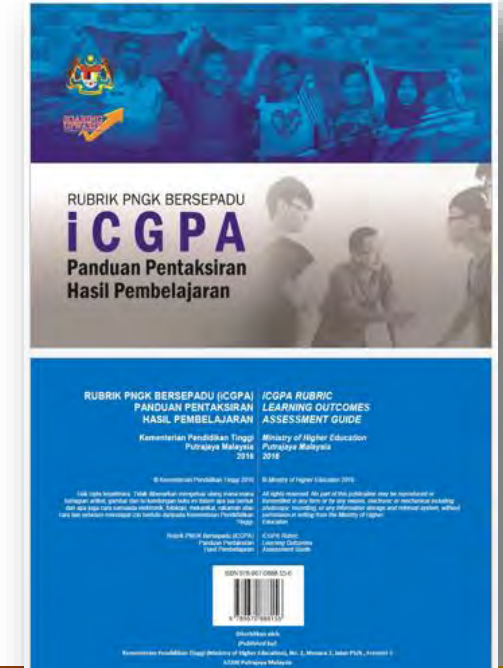
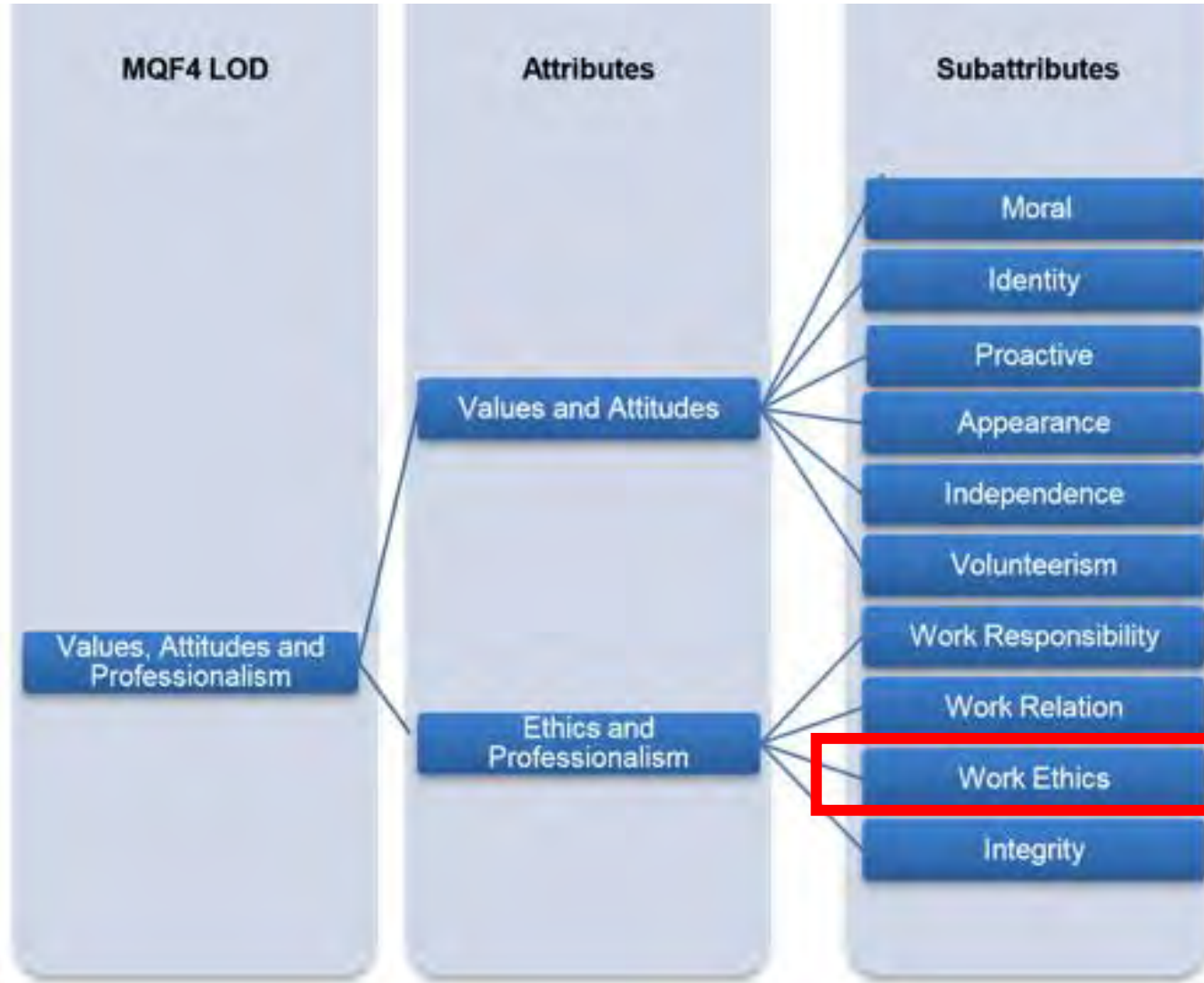
7 COURSE LEARNING OUTCOMES (CLO):

- | | | | |
|------|---|---|---------------|
| 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 <u>work practices</u> in order to maintain health and safe work environment. | (A3 , PLO 8) |
| CLO3 | : | Forms <u>communication</u> skills in a team to respond for an accident action at workplace. | (A3 , PLO 10) |

MQF4 ATTRIBUTES & SUBATTRIBUTES

DUW10022 Occupational Safety and Health for Engineering

Rujuk kepada iCGPA
Untuk rujukkan rubik
yang berkaitan



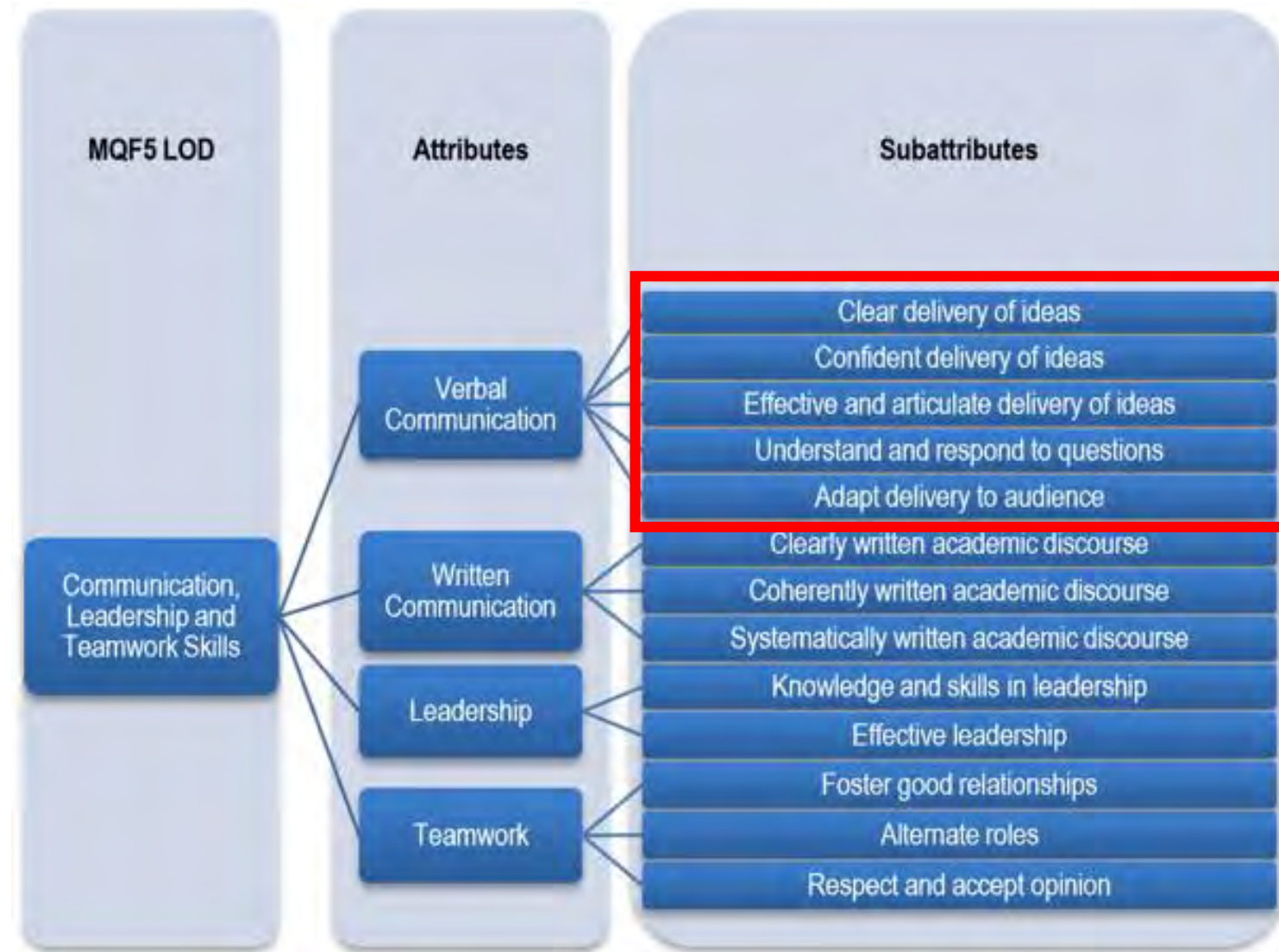
MQF4 ATTRIBUTES & SUBATTRIBUTES

DUW10022 Occupational Safety and Health for Engineering

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
Ethics and Professionalism	Work Ethics	Practise inappropriate working culture such as bad behaviour, no punctuality as well as not being efficient, productive and ethical at work in all situations	Practise less appropriate working culture such as inconsistent behaviour, less punctuality as well as being less efficient, productive and ethical at work in many situations	Practise good working culture such as good moral, timeliness as well as being efficient, productive and ethical at work in general	Practise good working culture such as good moral, timeliness as well as being efficient, productive and ethical at work in most situations	Always practise excellent working culture such as good moral, timeliness as well as being efficient, productive and ethical at work in all situations

MQF5 ATTRIBUTES & SUBATTRIBUTES

DUW10022 Occupational Safety and Health for Engineering



Rujuk kepada iCGPA
Untuk rujukkan rubik
yang berkaitan



MQF5 ATTRIBUTES & SUBATTRIBUTES

DUW10022 Occupational Safety and Health for Engineering

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
Verbal Communication	Clear delivery of ideas	Not able to deliver ideas clearly and require major improvements	Able to deliver ideas and require further improvements	Able to deliver ideas fairly clearly and require minor improvements	Able to deliver ideas clearly	Able to deliver ideas with great clarity
	Confident delivery of ideas	Not able to deliver ideas confidently	Able to deliver ideas with limited confidence and require further improvements.	Able to deliver ideas fairly confidently and require minor improvements	Able to deliver ideas confidently	Able to deliver ideas with great confidence
	Effective and articulate delivery of ideas	Not able to deliver ideas effectively	Able to deliver ideas with limited effect and require further improvements	Able to deliver ideas fairly effectively and require minor improvements	Able to deliver ideas effectively and articulately	Ability to deliver ideas with great effect and articulate
	Understand and respond to questions	Not able to understand and respond to a question	Able to understand and answer questions but not able to accurately answer the question	Able to understand and answer questions satisfactorily	Able to respond to questions well	Able to fully understand and respond to questions very well
	Adapt delivery to audience level	Not able to deliver appropriately to the audience level	Able to deliver ideas with limited appropriateness to the target audience and require further improvements.	Able to deliver ideas appropriately to the target audience satisfactorily	Able to deliver ideas appropriately to the target audience well	Able to fully deliver ideas appropriately very well

GENERIC SKILLS

MPU22012 ENTREPRENEURSHIP

GENERIC SKILLS

MPU22012 ENTREPRENEURSHIP

		Cluster (CLS)								Teaching Methods	Assessment Methods
		CLS 1	CLS 2	CLS 3a	CLS 3b	CLS 3c	CLS 3d	CLS 4	CLS 5		
CLO1	Propose the value proposition of entrepreneurial idea using Business model Canvas (A3)				/					Interactive Lecture	Product Pitching
CLO2	Develop a viable business plan by organizing business objectives according to priorities (A4)							/			Business Plan Presentation
CLO3	Organise the online presence business in social media marketing platform (A3)							/			Online Business Report

CLS3b	The Engineer and Society	PLO6
CLS5	Environment and Sustainability	PLO7
CLS5	Ethics	PLO8
CLS3d	Individual and Teamwork	PLO9
CLS3b	Communications	PLO10
CLS4	Project Management and Finance	PLO11
CLS4	Life Long Learning	PLO12

CLO1 → CLS3b
CLO2 → CLS4
CLO3 → CLS4



KKM4/MQF3 (iCGPA)
KKM5/MQF5 (iCGPA)
KKM4/MQF7 (iCGPA)
KKM5/MQF8 (iCGPA)

GENERIC SKILLS

MPU22012 ENTREPRENEURSHIP

9

TRANSFERABLE SKILLS:

- a. Interpersonal & Communication skills
- b. Personal & Entrepreneurial Skills
- c. Ethics & Professionalism

01 Generic Skills.

02 Generic Skills.

03 Generic Skills.

GENERIC SKILLS

MPU22012 ENTREPRENEURSHIP

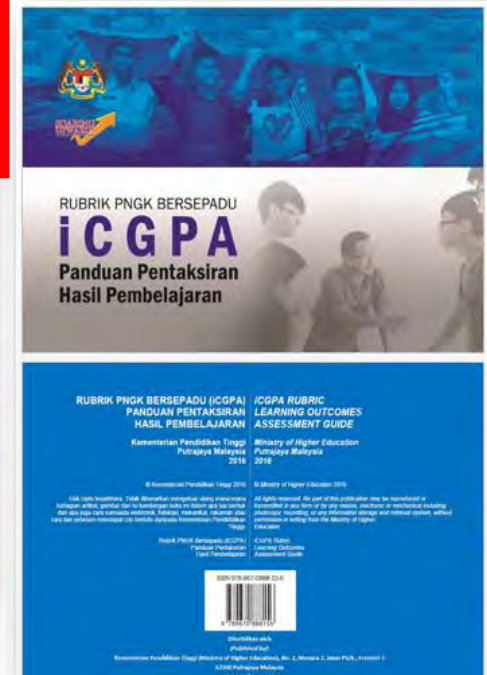
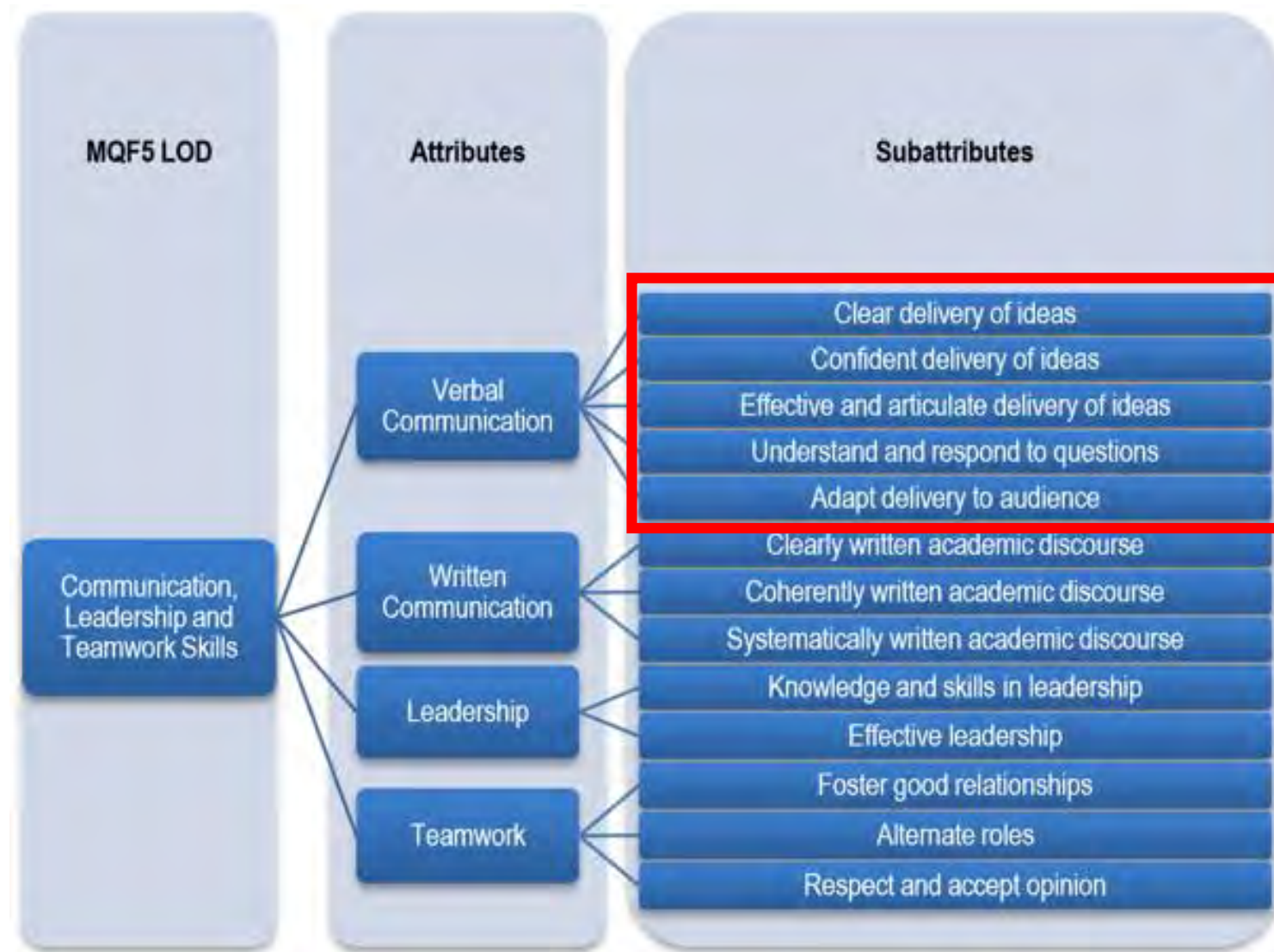
Upon completion of this course, students should be able to:

- CLO1 : Propose the value proposition of entrepreneurial idea using Business model Canvas (A3 , CLS 3b)
- CLO2 : Develop a viable business plan by organizing business objectives according to priorities (A4 , CLS 4)
- CLO3 : Organise the online presence business in social media marketing platform (A3 , CLS 4)

MQF5 ATTRIBUTES & SUBATTRIBUTES

MPU22012 ENTREPRENEURSHIP

Rujuk kepada iCGPA
Untuk rujukkan rubik
yang berkaitan



MQF5 ATTRIBUTES & SUBATTRIBUTES

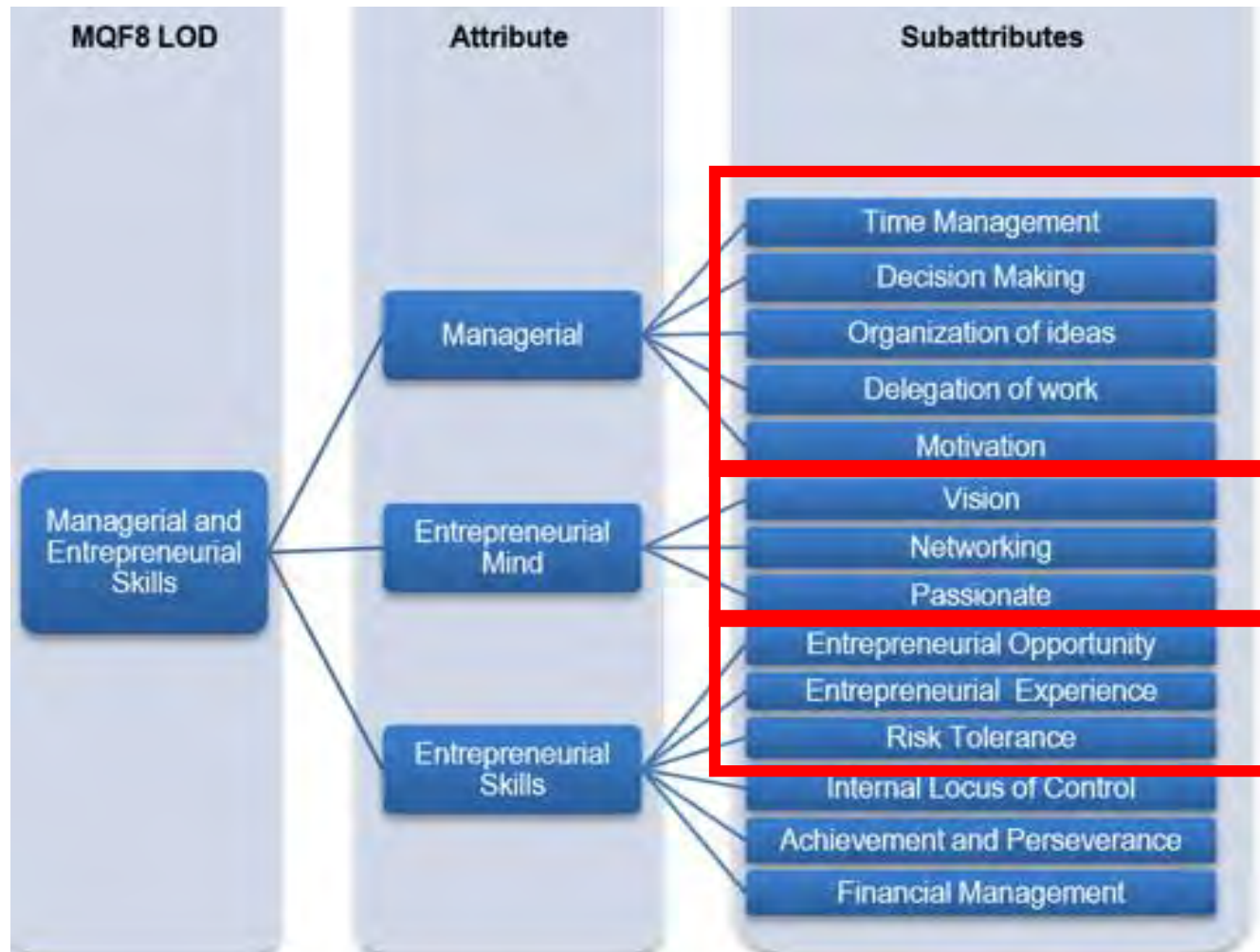
MPU22012 ENTREPRENEURSHIP

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
Verbal Communication	Clear delivery of ideas	Not able to deliver ideas clearly and require major improvements	Able to deliver ideas and require further improvements	Able to deliver ideas fairly clearly and require minor improvements	Able to deliver ideas clearly	Able to deliver ideas with great clarity
	Confident delivery of ideas	Not able to deliver ideas confidently	Able to deliver ideas with limited confidence and require further improvements.	Able to deliver ideas fairly confidently and require minor improvements	Able to deliver ideas confidently	Able to deliver ideas with great confidence
	Effective and articulate delivery of ideas	Not able to deliver ideas effectively	Able to deliver ideas with limited effect and require further improvements	Able to deliver ideas fairly effectively and require minor improvements	Able to deliver ideas effectively and articulately	Ability to deliver ideas with great effect and articulate
	Understand and respond to questions	Not able to understand and respond to a question	Able to understand and answer questions but not able to accurately answer the question	Able to understand and answer questions satisfactorily	Able to respond to questions well	Able to fully understand and respond to questions very well
	Adapt delivery to audience level	Not able to deliver appropriately to the audience level	Able to deliver ideas with limited appropriateness to the target audience and require further improvements.	Able to deliver ideas appropriately to the target audience satisfactorily	Able to deliver ideas appropriately to the target audience well	Able to fully deliver ideas appropriately very well

MQF8 ATTRIBUTES & SUBATTRIBUTES

MPU22012 ENTREPRENEURSHIP

Rujuk kepada iCGPA
Untuk rujukkan rubik
yang berkaitan



MQF8 ATTRIBUTES & SUBATTRIBUTES

Attribute	Subattribute	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
1.0 Managerial	Time Management	No attempt to complete work on time. Not able to manage time.	Rarely completes work on time. Not able to manage time well.	Occasionally completes work on time. Tries to manage time.	Completes work on time by taking advantage of the time provided and by using time management skills.	Completes tasks ahead of schedule by creating a plan and scheduling time to complete the work.
	Decision making	No attempt to make decision. Do not understand the situation and relate with options that are available.	Tries to make decision by understanding the situation. Decision made is based on limited understanding of the situation and available options.	Satisfactory attempts to make decisions and satisfactory understanding of the situation and available options.	Able to make a good decision based on good understanding of the situation and available options.	Able to make a very good decision based on excellent understanding of the situation and available options.
	Organization of ideas	Deliver ideas unclearly, loosely and disorganized.	Deliver ideas with minimal clarity, comprehensiveness and organization.	Deliver ideas with satisfactory clarity, comprehensiveness and organization.	Deliver ideas with good clarity, comprehensiveness and organization.	Deliver ideas with excellent clarity, comprehensiveness and organization.
	Delegation of work	Work was not divided equally. Only few members are doing the work while others are ignored.	Work was divided minimally amongst group members.	Work was divided satisfactorily amongst group members.	Work was divided well amongst group members.	Work was divided excellently amongst group members.
	Motivation	No motivation to complete task.	Minimal motivation to complete task.	Satisfactory motivation to complete task.	High motivation to complete task.	Very high motivation to complete task.

MQF8 ATTRIBUTES & SUBATTRIBUTES

MPU22012 ENTREPRENEURSHIP

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
Entrepreneurial Skills	Entrepreneurial Opportunity	No entrepreneurial idea for value adding/solving customer needs.	Has unclear entrepreneurial idea for value adding/solving customer needs and is not relevant to customer needs.	Business idea is clear but does not fulfil the realistic customer needs.	Business idea is clear and fulfils the customer needs.	Able to mobilise the idea to become opportunity according to the business strategy and fulfil the customer needs.
	Entrepreneurial Experience	Not able to write a reflection report for an entrepreneurial activity that he/she attends.	Able to write a poor reflection report for an entrepreneurial activity that he/she attends.	Able to write a satisfactory reflection report for an entrepreneurial activity that he/she attends	Able to write a good reflection report for an entrepreneurial activity that he/she attends.	Able to write an excellent reflection report for an entrepreneurial activity that he/she attends.
	Risk Tolerant	Not able to identify risk.	Able to identify risk.	Able to get the information to reduce risks.	Able to measure and analyse risks.	Able to suggest alternatives to reduce risks.

MQF8 ATTRIBUTES & SUBATTRIBUTES

MPU22012 ENTREPRENEURSHIP

Attributes	Sub Attributes	Very Weak (1)	Weak (2)	Fair (3)	Good (4)	Very Good (5)
2.0 Entrepreneurial Mind	Vision	No vision to solve problem.	Minimal vision to solve problem.	Satisfactory vision to solve problem.	Good vision to solve problem.	Excellent vision to solve problem.
	Networking	No awareness that an entrepreneur requires entrepreneurial networking.	Minimal awareness that an entrepreneur requires entrepreneurial networking.	Satisfactory awareness that an entrepreneur requires entrepreneurial networking.	Good awareness that an entrepreneur requires entrepreneurial networking.	Excellent awareness that an entrepreneur requires entrepreneurial networking.
	Passionate	Dislike to organise an entrepreneurial activity.	Minimal liking to organise an entrepreneurial activity.	Satisfactory liking and enjoys to organise an entrepreneurial activity.	Likes and enjoys to organise an entrepreneurial activity.	Passionate to organise an entrepreneurial activity.

ITEM 14 - COURSE SYLLABUS

COURSE SYLLABUS

DET10022 ELECTRICAL WIRING

- Kenalpasti aras-aras kognitif bagi setiap topik dan sub-topik dalam kursus dan penulisan 'General Statement' (GS).

- Kenalpasti aras-aras kognitif bagi setiap sub-topik dan penulisan 'Specific Statement' (SS).

Rujuk Taksonomi Pembelajaran Politeknik 2016

14	COURSE SYLLABUS:
	1.0 Electrical Safety
C1	1.1 Remember electrical hazards
	1.1.1 Identify the hazards in electrical installation.
	1.1.2 Identify the hazards in faulty electrical parts.
	1.2 Remember dangers of electrical shocks
	1.2.1 Identify the direct contact of electrical shock.
	1.2.2 Identify the indirect contact of electrical shock.
C2	1.3 Understand working environment safety
	1.3.1 Explain how to create safe working environment.
	1.3.2 Explain waste management practices.
C3	1.4 Apply working practices safety
	1.4.1 Use safety procedures to avoid wet working conditions and other dangers.
	1.4.2 Use and maintain tools properly.
	1.4.3 Apply the MS IEC 60364 to obtain the concept and principles of electrical safety and regulation in performing electrical installation.
	2.0 Accessories And Tools In Electrical Installation
	2.1 Remember the function and installation methods of the accessories for electrical installation.
	2.1.1 Identify the function and installation methods of electrical installation accessories: switches, lamp holders, outlet sockets, circuit breakers, fuses, kWh meters, distribution boards, distribution fuse boxes.

ITEM 15 - ASSESSMENT

DEC40053 EMBEDDED SYSTEM APPLICATION

ASSESSMENT

DEC40053 EMBEDDED SYSTEM APPLICATION

CLO	PLO	CLS	DT	PROPOSED TEACHING & LEARNING ACTIVITIES	CONTINUOUS ASSESSMENT WEIGHTAGE (%)					FINAL ASSESSMENT WEIGHTAGE (%)	SLT (hours)	PROPOSED TOPIC
					Quiz	Test	Practical Work	Mini Project		Final Examination		
					(2) 10%	(1) 10%	(6) 25%	(1) 10%	5%	(1) 40%		
CLO1 : Investigate internal features of PIC16F/PIC18F to interface properly with external devices		2	C4	Interactive Lecture	•						46	T1-T3 T4-T5
						•						T1,T3-T4
								•				T5
										•		T1,T3,T4
CLO2 : Design embedded system application based on PIC16F/PIC18F microcontroller effectively	3	2	C6	Interactive Lecture		•					30	T5
								•				T5
										•		T5
CLO3 : Construct and simulate real-time embedded system application based on PIC16F/PIC18F microcontroller effectively	5	3a, 3c	P4	Practical Work			•				39	T1-T5
				Mini Project Development				•				T5

ASSESSMENT

DEC40053 EMBEDDED SYSTEM APPLICATION

CLO	PLO	CLS	DT	PROPOSED TEACHING & LEARNING ACTIVITIES	CONTINUOUS ASSESSMENT WEIGHTAGE (%)					FINAL ASSESSMENT WEIGHTAGE (%)	SLT (hours)	PROPOSED TOPIC
					Quiz	Test	Practical Work	Mini Project		Final Examination		
					(2) 10%	(1) 10%	(6) 25%	(1) 10%	5%	(1) 40%		
CLO4 : Demonstrate knowledge of engineering project management principles through a written report on an assigned mini project	11	4	A3	Mini Project Report					•		5	T2,T5
										TOTAL SLT:	120	

Remarks/ Notes:

DT : DOMAIN TAXONOMY

/ : OR

- : UNTIL

, : AND

ASSESSMENT

DEC40053 EMBEDDED SYSTEM APPLICATION

CLO	PLO	CLS	DT	PROPOSED TEACHING & LEARNING ACTIVITIES	CONTINUOUS ASSESSMENT WEIGHTAGE (%)					FINAL ASSESSMENT WEIGHTAGE (%)	SLT (hours)	PROPOSED TOPIC
					Quiz	Test	Practical Work	Mini Project		Final Examination		
					(2) 10%	(1) 10%	(6) 25%	(1) 10%	5%	(1) 40%		
CLO1 : Investigate internal features of PIC16F/PIC18F to interface properly with external devices		2	C4	Interactive Lecture	•							T1-T3
												T4-T5
						•					46	T1,T3-T4
								•				T5
										•		T1,T3,T4

Quiz 1 = Topik 1 sehingga (-) Topik 3

Test = Topik 1 dan (,) Topik 3 sehingga (-) Topik 4

Quiz 2 = Topik 4 sehingga (-) Topik 5

ASSESSMENT

DEC40053 EMBEDDED SYSTEM APPLICATION

CLO	PLO	CLS	DT	PROPOSED TEACHING & LEARNING ACTIVITIES	CONTINUOUS ASSESSMENT WEIGHTAGE (%)					FINAL ASSESSMENT WEIGHTAGE (%)	SLT (hours)	PROPOSED TOPIC
					Quiz	Test	Practical Work	Mini Project		Final Examination		
					(2) 10%	(1) 10%	(6) 25%	(1) 10%	5%	(1) 40%		
Investigate internal features of CLO1 : PIC16F/PIC18F to interface properly with external devices		2	C4	Interactive Lecture	•						46	T1-T3 T4-T5
						•						T1,T3-T4
								•				T5
										•		T1,T3,T4

Mini Project = Topik 5

Final Examination = Topik 1 dan (,) Topik 3 dan (,) Topik 4

ASSESSMENT

DEC40053 EMBEDDED SYSTEM APPLICATION

CLO	PLO	CLS	DT	PROPOSED TEACHING & LEARNING ACTIVITIES	CONTINUOUS ASSESSMENT WEIGHTAGE (%)					FINAL ASSESSMENT WEIGHTAGE (%)	SLT (hours)	PROPOSED TOPIC
					Quiz	Test	Practical Work	Mini Project		Final Examination		
					(2) 10%	(1) 10%	(6) 25%	(1) 10%	5%	(1) 40%		
Design embedded system application CLO2 : based on PIC16F/PIC18F microcontroller effectively	3	2	C6	Interactive Lecture		•						T5
								•			30	T5
										•		T5

TEST = 1 TEST - 10%
ONLY Topic 5

MINI PROJECT = TECHNICAL TASK - 10%
ONLY Topic 5

MINI PROJECT
(AFFECTIVE)-5%
ONLY Topic 5

ASSESSMENT

DEC40053 EMBEDDED SYSTEM APPLICATION

CLO	PLO	CLS	DT	PROPOSED TEACHING & LEARNING ACTIVITIES	CONTINUOUS ASSESSMENT WEIGHTAGE (%)					FINAL ASSESSMENT WEIGHTAGE (%)	SLT (hours)	PROPOSED TOPIC
					Quiz	Test	Practical Work	Mini Project		Final Examination		
					(2) 10%	(1) 10%	(6) 25%	(1) 10%	5%	(1) 40%		
CLO3 : Construct and simulate real-time embedded system application based on PIC16F/PIC18F microcontroller effectively	5	3a, 3c	P4	Practical Work			•				39	T1-T5
				Mini Project Development				•				T5

Practical Work = Topik 1 sehingga (-) Topik 5

Mini Project = ONLY Topik 5

ASSESSMENT

DEC40053 EMBEDDED SYSTEM APPLICATION

CLO	PLO	CLS	DT	PROPOSED TEACHING & LEARNING ACTIVITIES	CONTINUOUS ASSESSMENT WEIGHTAGE (%)					FINAL ASSESSMENT WEIGHTAGE (%)	SLT (hours)	PROPOSED TOPIC
					Quiz	Test	Practical Work	Mini Project		Final Examination		
					(2) 10%	(1) 10%	(6) 25%	(1) 10%	5%	(1) 40%		
CLO4 : Demonstrate knowledge of engineering project management principles through a written report on an assigned mini project	11	4	A3	Mini Project Report							5	T2,T5
TOTAL SLT:											120	

MiniProject = rubric
Topik 2 dan (,) Topik 5

ITEM 15 - ASSESSMENT

DET1022 ELECTRICAL WIRING

ASSESSMENT

DET1022 ELECTRICAL WIRING

- i. **Continuous Assessment (CA) – 100%**
- ii. **Final Examination (FE) /Final Assessment (FA) – 0%**
Final examination/ Final assessment is carried out at the end of the semester.

CLO	PLO	CLS	DT	PROPOSED TEACHING & LEARNING ACTIVITIES	CONTINUOUS ASSESSMENT WEIGHTAGE (%)					SLT (hours)	PROPOSED TOPIC
					Quiz	Mini Project	Practical Test	Practical Work			
					(2) 10%	(1) 20%	(1) 15%	(6) 50%	5%		
CLO1 : Apply the concept and principle of electrical safety and regulation in performing electrical wiring according to MS IEC 60364.	1	1	C3	Interactive Lecture	●					28	T1/T2/T3/T4/T5
CLO2 : Construct single phase domestic wiring according to MS IEC 60364.	5	3a	P4	Laboratory Activity		●				50	T3-T5
							●				T3-T5
						●					T3-T5
CLO3 : Demonstrate an understanding of safety, ethics and responsibility in performing single phase wiring.									●	2	T3/T4/T5
TOTAL SLT:										80	

Remarks/ Notes:

Quiz 1 = Topik1 atau Topik2 atau Topik3 atau Topik4 atau Topik5

Remarks/ Notes:

ITEM 15 - ASSESSMENT

DEE40082 PROJECT 1

ASSESSMENT

DEE40082 PROJECT 1

15

ASSESSMENT:

The course assessment consists of:

- i. Continuous Assessment (CA) – 100%
- ii. Final Examination (FE) /Final Assessment (FA)– None

CLO	PLO	CLS	DT	PROPOSED TEACHING & LEARNING ACTIVITIES	CONTINUOUS ASSESSMENT WEIGHTAGE (%)							SLT (hours)	PROPOSED TOPIC
					Investigation Report		Logbook	Final Proposal					
					(1) 10%	(1) 15%	(1) 35%	(1) 10%	(1) 10%	(1) 10%	(1) 10%		
CLO1 : Investigate well defined problem in order to make improvements on a chosen project	4	2	C4	Discussion on Investigation	•							7.5	T1, T3
CLO2 : Evaluate engineering problem and conduct research in order to make improvements on a chosen project whether the project is on the hardware, software or hardware-software interface type	2	2	C5	Discussion on Problem Solution		•						14.0	T1, T3
CLO3 : Perform project construction procedures (hardware project) or produce flowchart and draft algorithm for system programme (software project) and record the progress systematically in a logbook	5	3a,3c	p4	Progress Project & Mini Project Construction			•					30.5	T4
CLO4 : Display good project management and finance through a Gantt Chart (milestone) and final proposal	11	4	A3	Discussion on Final Proposal Writing				•				8.5	T2, T3

ASSESSMENT

DEE40082 PROJECT 1

CLO	PLO	CLS	DT	PROPOSED TEACHING & LEARNING ACTIVITIES	CONTINUOUS ASSESSMENT WEIGHTAGE (%)							SLT (hours)	PROPOSED TOPIC
					Investigation Report		Logbook	Final Proposal					
					(1) 10%	(1) 15%	(1) 35%	(1) 10%	(1) 10%	(1) 10%	(1) 10%		
CLO5 : Demonstrate continuous learning, information management and independent acquisition of new knowledge and skill to support the development of the project through the final proposal	12	4	A3	Discussion on Project Task					•			6.5	T3
CLO6 : Display written communication skill through a final proposal	10	3b	A3	Report Writing						•		6.5	T3
CLO7 : Describe the impact of the proposed project to the society in the final proposal	6	3b	A3	Discussion							•	6.5	T3
TOTAL SLT:												80	

Remarks/ Notes:

DT : DOMAIN TAXONOMY

/ : OR

- : UNTIL

, : AND