

SESI AKADEMIK 2020/2021

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# Program Sarjana Muda BUKU PANDUAN AKADEMIK



UNTUK VERSI SALINAN ATAS TALIAN

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**MBAS KOD QR +** 

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#### KATA-KATA ALUAN NAIB CANSELOR

السلام عليكم ورحمة اللموبركاته

#### Salam sejahtera.



Saya bagi pihak seluruh warga Universiti Pertahanan Nasional Malaysia ingin mengucapkan setinggi-tinggi tahniah dan selamat datang kepada saudara dan saudari yang telah terpilih untuk mengikuti pengajian peringkat Ijazah Sarjana Muda Sesi Akademik 2020/2021 di UPNM. Sesungguhnya kehadiran anda di UPNM merupakan langkah yang tepat bagi melengkapkan dan mempersiapkan diri untuk bergelar graduan bercirikan Intellectual Leaders of Character yang bakal mewarisi tampuk kepimpinan di pelbagai organisasi.

Universiti memainkan peranan yang sangat signifikan sebagai pusat transformasi dalam melahirkan pemimpin holistik yang serba boleh dan berkesan. Sehubungan itu, saya berharap agar saudara saudari mengambil manfaat atas ruang dan peluang di usia muda ini untuk melatih serta mencungkil potensi diri agar dapat menyumbang peranan terhadap kemaslahatan agama, bangsa dan negara. Sepanjang berada di UPNM, saudara dan saudari akan diterapkan dengan dua aspek utama iaitu ilmu pengetahuan dan rutin latihan ketenteraan. Kedua-dua aspek ini digarap khusus bagi membina minda dan fizikal saudara saudari yang merangkumi aspek falsafah, konseptual dan operasi. Saya amat yakin bahawa dengan kesepaduan akademik dan ketenteraan, saudara saudari akan melalui proses indoktrinasi dengan nilai-nilai intelek serta sahsiah yang pasti dapat mengukuhkan jati diri, kepercayaan dan komitmen untuk berbakti dengan sepenuh jiwa raga kepada negara.

Akhir kata, saya berharap agar buku panduan akademik ini dapat dimanfaatkan sepenuhnya oleh saudara dan saudari sekalian terutamanya dalam memahami proses dan prosedur yang berkaitan di sepanjang pengajian. Insya-Allah.

Sekian. Salam hormat.

وباالله توفق والهدايه والسلام عليكم ورحمة الله وبركاته

"KEWAJIPAN, MARUAH, INTEGRITI"

#### **LT JEN DATUK HJ. ABDUL HALIM BIN HJ. JALAL** Naib Canselor Universiti Pertahanan Nasional Malaysia



#### KATA-KATA ALUAN DEKAN



#### Bismillahirrahmanirrahim Assalamualaikum w.r.t. w.b.t dan Salam Sejahtera

Tahniah dan Selamat Datang kepada saudara/saudari di atas kejayaan melanjutkan pengajian peringkat Ijazah Sarjana Muda Kejuruteraan di Fakulti Kejuruteraan, Universiti Pertahanan Nasional Malaysia.

Terlebih dahulu, saya bersama-sama dengan semua warga Fakulti Kejuruteraan memanjatkan kesyukuran ke hadrat Allah SWT kerana dengan izin-Nya Fakulti Kejuruteraan telah berjaya menerbitkan Buku Panduan Fakulti Kejuruteraan Sesi 2020/2021. Objektif utama Buku Panduan ini diterbitkan adalah sebagai bahan rujukan pelajar dalam mengenali Fakulti amnya dan Jabatan khususnya serta program pengajian yang ditawarkan kerana salah satu asas bagi mencapai kecemerlangan ialah kebijaksanaan pelajar dalam merancang pengajian melalui pemilihan kursus yang sesuai dan memaksimumkan segala kemudahan yang disediakan oleh Universiti. Melalui buku ini pelajar dapat memahami sistem akademik yang diamalkan seperti sistem semester dan kurikulum pengajian. Buku ini juga dapat membantu pelajar merencana pengajian akademik masing-masing berpandukan rancangan dan skema pengajian yang terkandung di dalamnya.

Di kesempatan ini, suka saya rakamkan setinggi-tinggi penghargaan dan ucapan terima kasih kepada Ahli Jawatankuasa Buku Panduan Fakulti dan semua pihak yang terlibat secara langsung atau tidak langsung dalam penyediaan Buku Panduan ini.

Akhir kata, saya berharap Buku Panduan Fakulti ini dapat dimanfaatkan sepenuhnya oleh pelajar di samping mempertingkatkan kualiti pengajaran, pembelajaran dan penyelidikan serta mengekalkan kecemerlangan Fakulti Kejuruteraan.

Selamat berjuang dan maju jaya.

Sekian.

KOL PROF. MADYA DR. KHAIROL AMALI BIN AHMAD (BERSARA) Dekan Fakulti Kejuruteraan Universiti Pertahanan Nasional Malaysia

#### **UNIVERSITI PERTAHANAN NASIONAL MALAYSIA**

#### VISI

Menjadi universiti pertahanan *premier* untuk pendidikan, latihan dan penciptaan ilmu.

#### FALSAFAH

Sebagai sebuah institusi nasional *premier* berdedikasi dalam menghasilkan pemimpin berintelektual yang menyerlah serta bersifat terpuji dan komited untuk berbakti sepenuhnya kepada negara dalam menjayakan kelangsungan kepentingan strategik negara.

#### MISI

UPNM komited mencapai kecemerlangan perkhidmatan kepada negara sebagai sebuah universiti pertahanan *premier* dalam kepimpinan dan pembangunan profesional, penciptaan ilmu, penyebaran ilmu pengetahuan dan aplikasi sains pertahanan dan teknologi, dan juga penyelidikan polisi.

#### OBJEKTIF

- i. Menyediakan asas pengetahuan yang kukuh dan seimbang dalam bidang kemanusiaan, pengurusan, sains dan teknologi, serta menerap daya usaha intelektual melalui pengajaran, pembelajaran, penyelidikan dan usaha kesarjanaan yang bertaraf antarabangsa.
- ii. Menanam semangat kesetiaan dan patriotisme yang tinggi untuk berbakti kepada negara dengan berbekalkan ilmu, kemahiran serta kecekapan asas ketenteraan.
- iii. Membangunkan warga yang mempunyai tanggungjawab sosial dengan berteraskan kepada unsur-unsur kerohanian, etika budaya dan moral yang terpuji.
- iv. Membentuk pemimpin masa depan yang memahami, menghayati, dan mempunyai sikap toleransi terhadap kepelbagaian etnik, budaya dan agama.
- v. Membekalkan pemimpin masa depan dengan kebolehan berkomunikasi,
- vi. Menjadi pusat kecemerlangan dalam bidang teknologi pertahanan, ekonomi dan diplomasi, hal ehwal ketenteraan serta pengajian keselamatan.

#### мото

KEWAJIPAN, MARUAH, INTEGRITI (Duty, Honour, Integrity)

#### LOGO UNIVERSITI





Logo UPNM mempunyai dua lapisan berbentuk bulat menggambarkan kebulatan tekad dan graduan kesatuan semangat UPNM dalam menyempurnakan tanggungjawab mempertahankan negara selepas tamat pengajian dimana ini adalah satu komitmen yang tidak berbelah bahagi untuk mempertahankan tanah air dan semua kepentingan-kepentingan strategiknya. Warna biru yang mengelilingi lapisan luaran logo melambangkan keamanan juga mewakili komitmen negara untuk mempertahan, mengekal dan mempromosi keamanan, serta menekankan komitmen UPNM untuk menyokong keamanan melalui pendidikan. Komponen-komponen penting Angkatan Tentera Malaysia (ATM) diletakkan di tengahtengah logo UPNM dengan latar belakang tiga warna perkhidmatan Tentera Darat Malaysia, Tentera Laut Diraja Malaysia dan Tentera Udara Diraja Malaysia yang membawa makna bahawa kepentingan ATM adalah sangat dominan. Sementara lingkaran bunga padi berwarna kuning sebagai lambang asas budaya Malaysia yang subur serta memiliki raja vang berdaulat dan baginda ditaati sepanjang masa. NDUM - Singkatan nama universiti dalam Bahasa Inggeris (National Defence University of Malaysia) dipaparkan di bahagian atas di antara pertemuan dua bunga padi. Ini juga melambangkan bahawa universiti ini sebuah institusi pengajian tinggi dipersada antarabangsa. Angka 2006 merupakan tahun pembukaan universiti diletakkan bertentangan perkataan NDUM di bawah logo. Bunga raya yang juga bunga kebangsaan Malaysia melambangkan bunga rasmi universiti dan kerana Malaysialah universiti ini ditubuhkan.

#### **COKMAR UNIVERSITI**



Cokmar UPNM adalah berasaskan Pedang *Zulfaqar* yang pernah diberikan oleh Nabi Muhammad S.A.W kepada menantunya Sayyidina Ali bin Abi Talib Karramullah Wajha ketika Perang Uhud.

Pedang Zulfaqar yang panjangnya 5 kaki adalah diperbuat daripada logam perak dengan campuran besi dan bersalut emas. Petikan ayat 60 surah Al-Anfal (*Maksudnya;*" Dan persiapkanlah dengan segala kemampuan untuk menghadapi musuh dengan kekuatan yang kamu miliki") ditatahkan pada kedua belah mata pedang. Bahagian hujung sarung Zulfaqar dihiasi dengan batu manikam (*topaz*) berwarna kuning diraja khusus bagi melambangkan kedaulatan raja-raja Melayu. Ini diikuti dengan batu delima (*ruby*) yang memancarkan cahaya warna merah cili yang melambangkan Tentera Darat Malaysia. Manakala batu nilam (*sapphire*) berwarna biru tua melambangkan Tentera Laut Diraja Malaysia dan batu nilam berwarna biru muda melambangkan Tentera Udara Diraja Malaysia.

Logo universiti yang diperbuat daripada emas tulen dilekatkan pada bahagian tengah hulu pedang. Jalaran motif daun sireh dan bunga raya menyaluti sebahagian besar sarung pedang yang memancarkan maksud kehalusan budi yang menjadi teras yang dipertahankan di universiti ini. Sesungguhnya paduan bilah pedang, ayat daripada Al-Quran dan kilauan batu-batu galian bernilai tinggi adalah manifestasi paduan falsafah ilmu yang tinggi dan kehadiran semangat juang yang tidak luntur di kalangan warga universiti.

#### LATAR BELAKANG UNIVERSITI PERTAHANAN NASIONAL MALAYSIA

Sejarah Universiti Pertahanan Nasional Malaysia (UPNM) bermula dengan penubuhan Akademi Tentera Malaysia (ATMA) pada 1 Jun 1995 sebagai organisasi yang bertanggungjawab menjalankan program pengajian di peringkat sarjana muda dan latihan ketenteraan kepada Pegawai Kadet Angkatan Tentera Malaysia (ATM). Peranan ATMA diperluaskan dengan menjadikannya sebagai UPNM yang diwartakan pada 10 November 2006.

Walaupun UPNM memulakan pengambilan kumpulan pertama pelajarnya pada sesi 2007/2008, sebenarnya ia telah mempunyai pengalaman mengendalikan program pengajian di peringkat sarjana muda selama 11 tahun iaitu dari tahun 1995 hingga 2006 melalui program kerjasama antara Kementerian Pertahanan Malaysia dengan Universiti Teknologi Malaysia.

UPNM telah ditubuhkan oleh Kerajaan Malaysia pada 21 Jun 2006 bagi mengeluarkan graduan tentera dan awam untuk keperluan pertahanan negara. Pengambilan pelajar adalah terdiri daripada pelajar kadet tajaan Kementerian Pertahanan Malaysia dan pelajar awam. Perintah pemerbadanan UPNM telah berkuatkuasa pada 10 November 2006 untuk mewujudkan sebuah universiti. Pengajian akademik telah bermula pada sesi 2007/2008 dengan tiga fakulti iaitu Fakulti Kejuruteraan, Fakulti Sains dan Teknologi Pertahanan, Fakulti Pengajian dan Pengurusan Pertahanan dan satu pusat iaitu Pusat Asasi Pertahanan. Satu lagi fakulti telah diluluskan penubuhannya oleh Kementerian Pengajian Tinggi pada 19 Mac 2009 iaitu Fakulti Perubatan dan Kesihatan Pertahanan.

Graduan pertama yang dihasilkan oleh UPNM adalah pada konvokesyen pertama UPNM pada tahun 2010 melibatkan seramai 148 orang graduan dan sehingga pada tahun 2019 jumlah keseluruhan graduan UPNM bagi tempoh 10 tahun majlis konvokesyen telah mencecah kepada angka 5,565 orang graduan.

Di samping memperoleh kelayakan profesional dalam bidang kejuruteraan, perubatan, sains dan pengurusan, semua graduan yang merupakan pegawai kadet telah di tauliahkan sebagai Pegawai ATM dan mereka sedang berkhidmat di pelbagai unit dalam Tentera Darat, Tentera Laut dan Tentera Udara Diraja Malaysia.

#### SENAT UNIVERSITI

- Lt Jen Datuk Hj. Abdul Halim bin Hj. Jalal Naib Canselor Pengerusi Senat
- 2. Prof. Emeritus Dato' Dr. Tengku Mohd bin Tengku Sembok Menjalankan Tugas Timbalan Naib Canselor (Akademik dan Antarabangsa)
- 3. Lt Kol Prof. Ts. Dr. Muhd Zuazhan bin Yahya Timbalan Naib Canselor (Hal Ehwal Pelajar dan Alumni)
- 4. Brig Jen Prof. Ir. Dr. Norazman bin Mohamad Nor (Bersara) Menjalankan Tugas Timbalan Naib Canselor (Penyelidikan dan Inovasi)

#### **AHLI EX-OFFICIO**

- 1. Puan Hjh. Sarina binti Abdul Rani Pendaftar
- 2. Encik Mohd Hairay bin Md Yusof Bendahari
- 3. Encik Mohammed Dzulkarnain bin Abdul Karim Ketua Pustakawan
- 4. Puan Zunika binti Sulaiman Pegawai Undang-undang

#### **DEKAN**

- Lt Kol Prof. Madya Ariffin bin Ismail (Bersara) Dekan Fakulti Pengajian dan Pengurusan Pertahanan
- Kol Prof. Madya Dr. Khairol Amali bin Ahmad (Bersara) Dekan Fakulti Kejuruteraan
- Lt Kdr Ts. Dr. Mohd Norsyarizad bin Razali TLDM (Bersara) Dekan Fakulti Sains dan Teknologi Pertahanan
- Brig Jen Prof. Datuk Dr. Hj. Adnan bin Hj. Abdullah Dekan
   Fakulti Perubatan dan Kesihatan Pertahanan



5. Prof. Dr. Aidy bin Ali Dekan Pusat Pengajian Siswazah

#### **PENGARAH**

- Prof. Madya. Dr. Norhana binti Abdul Halim Pengarah Pusat Asasi Pertahanan
- Prof. Madya Dr. Norshima binti Zainal Shah Pengarah Pusat Bahasa
- 3. Kol Felo Kanan Sofian bin Kamaruddin (Bersara) Pengarah Institut Pengajian Eksekutif UPNM
- Prof. Dr. Mohar bin Kassim
   Pengarah
   Akademi Kecergasan Pertahanan

#### WAKIL PROFESOR

- Prof. Dr. Abdul Ghapor bin Hussin Pengarah Pusat Pembangunan Akademik
- Lt Kol Prof. Dr. Victor Feizal bin Knight Victor Ernest @ Abd Shatar (Bersara) Pengarah Pusat Penyelidikan Pertahanan Kimia
- **3. Prof. Dr. Risby bin Mohd Sohaimi** Timbalan Dekan Pusat Pengajian Siswazah
- 4. Prof. Dr. Jowati binti Juhary Pengarah Penerbit UPNM
- Prof. Dr. Hjh. Fatimah binti Dato Ahmad Profesor
   Fakulti Sains dan Teknologi Pertahanan

#### <u>AHLI KO-OPT</u>

1. Prof. Dato' Dr. Jesbil Singh a/l Bahadur Singh Penolong Naib Canselor (Jaringan Industri dan Perhubungan Korporat)



- Prof. Emeritus Dato' Dr. Wan Md. Zin bin Wan Yunus Pengarah Pusat Pentropikalan
- Brig Jen Rozainy bin Ahmad Rapiee @ Ahmad Rofie TUDM Komandan Akademi Latihan Ketenteraan
- 4. Prof. Dato' Ts. Dr. Ahmad Mujahid bin Ahmad Zaidi Penolong Naib Canselor (Akademik dan Antarabangsa)

#### AHLI TURUT HADIR (TETAP)

- Prof. Madya Dr. Hj. Hasan Al-Banna bin Mohamed Pengarah Pusat Jaminan Kualiti dan Pengurusan Data
- Lt Kol Shahrul bin Sahusi (Bersara) Pengarah Jabatan Pembangunan dan Penyelenggaraan
- Dr. Mohd Rizal bin Mohd Isa
   Pengarah
   Pusat Teknologi Maklumat dan Komunikasi

#### **URUS SETIA**

- Encik Mohd Fadhzil bin Zainol Timbalan Pendaftar Bahagian Pengurusan Akademik
- Puan Rini Shazrina binti Zulkifly
   Penolong Pendaftar Kanan
   Unit Pentadbiran, Pengurusan Senat dan Konvokesyen
   Bahagian Pengurusan Akademik
- Puan Suzanah binti Sengoot
   Penolong Pegawai Tadbir Kanan
   Unit Pentadbiran, Pengurusan Senat dan Konvokesyen
   Bahagian Pengurusan Akademik



# FAKULTI KEJURUTERAAN



#### FAKULTI KEJURUTERAAN

#### VISI

### Menjadi Fakulti Kejuruteraan primier untuk pendidikan, latihan dan penjanaan ilmu kejuruteraan dan teknologi pertahanan.

#### MISI

Fakulti Kejuruteraan komited mencapai kecemerlangan sebagai sebuah Fakulti Kejuruteraan Primier dalam aplikasi Pertahanan yang menjurus kepada aspek Pembangunan Profesional, Penjanaan, Penyebaran Ilmu Pengetahuan, Aplikasi Kejuruteraan dan Teknologi Pertahanan.

#### OBJEKTIF

- i. Untuk mewujudkan keperluan strategi terfokus yang direka untuk memacu organisasi dalam mengejar kecemerlangan.
- Membentangkan panduan berstruktur untuk melaksanakan penyelesaian yang inovatif dan idea-idea untuk pengajaran dan pembelajaran untuk memastikan UPNM kekal relevan dalam konteks negara.
- iii. Untuk menggalakkan penerapan sistem pemikiran dan analisis yang sistematik untuk mendapatkan strategi praktikal kepada persekitaran.

#### мото

Attitude, Zealous, Achieve

#### LATAR BELAKANG FAKULTI KEJURUTERAAN

Fakulti Kejuruteraan merupakan fakulti yang terbesar di UPNM dengan kapasiti 92 pensyarah akademik termasuk 18 Jurutera Profesional sebagai tenaga pengajar serta dibantu oleh 32 kakitangan bukan akademik. Fakulti Kejuruteraan komited dalam mencapai kecemerlangan sebagai sebuah Fakulti Kejuruteraan primier dalam aplikasi pertahanan yang menjurus kepada aspek pembangunan profesional, penjanaan, penyebaran ilmu pengetahuan, aplikasi kejuruteraan dan teknologi pertahanan. Pada masa ini, fakulti diuruskan oleh Dekan dan dua (2) Timbalan Dekan bersama-sama dengan empat (4) Ketua Jabatan, Penolong Pendaftar Kanan, Penolong Pendaftar, dan dua (2) Pegawai Sains Kanan.

Setakat ini, Fakulti Kejuruteraan mempunyai empat (4) jabatan merangkumi Jabatan Kejuruteraan Awam, Jabatan Kejuruteraan Elektrik & Elektronik, Jabatan Kejuruteraan Mekanikal dan Jabatan Kejuruteraan Aeronautik dan Penerbangan. Kini Fakulti Kejuruteraan menawarkan empat (4) program Ijazah Sarjana Muda yang telah diperkenalkan pada Sesi Akademik 2007/2008 iaitu Ijazah Sarjana Muda Kejuruteraan Awam (ZK01), Ijazah Sarjana Muda Kejuruteraan Mekanikal (ZK08), Ijazah Sarjana Muda Kejuruteraan Elektrik dan Elektronik dengan Kepujian (ZK23) dan Ijazah Sarjana Muda Penerbangan (ZK61) dengan mod 2u2i (2 tahun di dalam universiti dan 2 tahun di dalam industri) yang mula diperkenalkan pada Sesi Akademik 2018/2019. Program-program ini telah disusun untuk memenuhi falsafah, visi dan misi fakulti dalam melahirkan pemimpin yang mempunyai nilai-nilai positif, kepimpinan yang tinggi dan profesionalisme sebagai jurutera yang kompeten dalam bidang yang diceburi.

Sehingga 2020, jumlah kakitangan fakulti telah meningkat sebagai usaha untuk memenuhi kriteria yang ditetapkan oleh Lembaga Jurutera Malaysia. Ini adalah bagi memastikan proses pengajaran dan aktiviti penyelidikan yang dijalankan adalah berkesan dan pertambahan bilangan staf selari dengan pertambahan bilangan pelajar mengikut piawaian yang ditetapkan.

#### PROGRAM YANG DITAWARKAN

Program-program yang ditawarkan di bawah Fakulti Kejuruteraan adalah seperti berikut:

- i. Sarjana Muda Kejuruteraan Awam (ZK 01)
- ii. Sarjana Muda Kejuruteraan Mekanikal (ZK 08)
- iii. Sarjana Muda Kejuruteraan Elektrik dan Elektronik dengan Kepujian (ZK 23)
- iv. Sarjana Muda Penerbangan (ZK 61)

#### **OBJEKTIF DAN HASIL PEMBELAJARAN**

Pencapaian para pelajar diukur oleh hasil pembelajaran. Hasil pembelajaran ini menetapkan kompetensi yang patut diperolehi oleh setiap pelajar apabila selesai mengikuti satu-satu program pengajian. Berikut adalah *Programme Educational Objectives* (PEO) dan *Programme Learning Outcome* (PO) yang telah ditetapkan bagi Program Sarjana Muda Kejuruteraan selaras dengan keperluan Majlis Akreditasi Kejuruteraan (EAC), Malaysia.

#### Programme Educational Objectives (PEO)

- PEO 1 Engineers possess positive personal values and decorum.
- PEO 2 Competent engineers in their respective fields.
- PEO 3 Engineers possess leadership and professional quality.

#### Program Learning Outcome (PO)

Technical Knowledge and Competencies

- PO 1 Engineering Knowledge Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialisation as specified in WK1 to WK4 respectively to the solution of complex engineering problems;
- PO 2 Problem Analysis Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences (WK1 to WK4);
- PO 3 Design/Development of Solutions Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations (WK5);
- **PO 4** Investigation Conduct investigation of *complex engineering problems* using research-based knowledge (*WK8*) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions;
- PO 5 Modern Tool Usage Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations (WK6);
- PO 6 The Engineer and Society Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems (WK7);
- PO 7 Environment and Sustainability Understand and evaluate the sustainability and impact of professional engineering work in the solutions of *complex engineering problems* in societal and environmental contexts. (*WK7*);
- **PO 8** Ethics Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice (*WK7*);
- **PO 9** Individual and Team Work Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings;



- **PO 10 Communication** Communicate effectively on *complex engineering activities* with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;
- **PO 11 Project Management and Finance** Demonstrate knowledge and understanding of engineering management principles and economic decision- making and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments;
- **PO 12 Life Long Learning** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change including defence, security and current issues.

For more details about WK1 to WK8, Complex Engineering Problem (WP), Complex Engineering Activities (EA), please refer to **EAC Standard 2020 Page 9 to 10.** 





#### SENARAI KAKITANGAN PENTADBIRAN FAKULTI KEJURUTERAAN

#### Dekan

Kol Prof. Madya Dr. Khairol Amali Bin Ahmad (Bersara) B.Sc. Electrical Electronic (West Point), M.Arts (US-CGSC, Ft Leavenworth), M.Sc. (Cranfield), M.Sc.(ISAE-Supaero, Toulouse), Ph.D. (ISAE-Supaero, Toulouse)

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#### Ketua Jabatan, Jabatan Kejuruteraan Elektrik dan Elektronik

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#### Ketua Jabatan, Jabatan Kejuruteraan Aeronautik dan Penerbangan

Prof. Madya Lt Kol Ir. Hj. Khalid bin Abd Jalil TUDM (Bersara) P.Eng, B.Sc. (Mech.) (HanYang, Korea), Master in Aviation Safety & Airworthiness (ENSICA/ENCA, Toulouse)

#### Penolong Pendaftar Kanan

Sharizal bin Mansor B.(Comm) (UPM), M. (Corporate Comm) (UPM)

#### Pegawai Sains Kanan

Santy anak Langie Bachelor of Technology (Environment)(UMT)

#### Pegawai Sains Kanan

Roslan bin Husin Bachelor of Technology (Environment)(UMT)

**Penolong Pendaftar** Mohd Azizi bin Ghazali Bachelor of Electrical and Electronics Engineering (Hons.), (UNITEN)



#### Setiausaha

Norley binti Ahmad Sulieman

#### Penolong Jurutera Kanan

Bahaman bin Haron

#### Penolong Pegawai Tadbir

Zhafri Ridhwan bin Abdullah Sonny

#### Penolong Pegawai Teknologi Maklumat

Mohd. Hermas bin Ab. Jalil Dip. Engineering Electronic (Computer) - PSIS, B.Eng. Electronic (Wireless Comm) - UTeM

#### Penolong Pegawai Teknologi Maklumat

Mohammad Afandi bin Paharozi Sijil Sistem Komputer & Sokongan (Kolej Komuniti)

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Zazlin bin Ismail Muhammad Rizal bin Ab. Razak Junaidi bin Asiran Nor Muhammad Azman bin Sujani Mior Mohamad Amin bin Jamaludin Mohd Fairuz bin Abdul Wahab Mohd Hisham bin Hashim Muhamad Khalil bin Sikun Mohd Rashidi bin Basar Zawil bin Mohd Yusof Suzana binti Mohd Norpiah Siti Zuraidah binti Zanal Halimathun binti A Halim Ahmad Faaiz bin Hussin Muhammad Amran bin Salleh

#### Pembantu Pegawai Latihan Vokasional

Salahudeen bin Sulaiman Mohamad Rizal bin Harun

**Pembantu Tadbir Kanan** Noraini binti Abdullah

#### Pembantu Tadbir (P/O)

Muhammad Rizalli bin Ganti Fatima Naim binti Shaharudin Nor Hazliza binti Arbain Hamizan Juzaili bin Hanafi

#### Pembantu Operasi

Ahmad Fuad bin Sharif



# KURSUS TERAS UNIVERSITI

#### KOMPONEN STRUKTUR PROGRAM SARJANA MUDA

Kursus-kursus untuk Program Sarjana Muda terdiri daripada komponen berikut:

- 1. Kursus Teras Universiti
- 2. Kursus Elektif Universiti
- 3. Kursus Teras Program
- 4. Kursus Elektif Program

Jumlah kredit wajib diambil bergantung kepada keperluan program yang diikuti. Kursus Teras Universiti dikendalikan oleh Fakulti Pengajian dan Pengurusan Pertahanan (FPPP), Pusat Bahasa (PB) dan Akademi Kecergasan Pertahanan.

#### **KURSUS TERAS UNIVERSITI**

Kursus Teras Universiti merupakan kursus wajib kepada semua pelajar Sarjana Muda tertakluk kepada program yang diikuti. Berikut merupakan senarai Kursus Teras Universiti yang ditawarkan:

KOD KURSUS	KURSUS	KREDIT
DUM 3022	Military Leadership	2
DUS 3012	Military History	2
DUS 3022	Introduction to Strategic Studies	2
DUS 3032	Military Law and Laws of Armed Conflict	2
MPU 3142	Philosophy and Current Issues	2
MPU 3132	Appreciation of Ethics and Civilizations	2
MPU 3212	Basic Entrepreneurship	2
MPU 3312	Nationhood in World Politics /	
MPU 3322	Blue Ocean Strategy and Total Defence /	2
MPU 3332	Fiqh Keutamaan	
MPU 3412	Human Movement Science /	2
MPU 3422	Community Service	
LLE 3012	English For Academic Writing	2
LLE 3032	Al - Ghazali's Dialogue: English Communication	2
LLF 3XX1	Foreign Language I	1
LLA 3XX1	Foreign Language I	(+1)
LLF 3XX1	Foreign Language II	1
LLA 3XX1	Foreign Language II	(+1)
	JUMLAH	24 (+2)

Kursus LLA 3XX1 tidak akan dikira dalam PNGS dan PNGK. Kursus ini dikira sebagai Audit.



Kursus *LLE3042: Basic Grammar and Vocabulary* hanya perlu di ambil oleh pelajar yang mendapat Band 1 dan 2 dalam peperiksaan MUET. Kursus ini wajib di ambil sebelum bergraduat dan berstatus Lulus/Gagal sahaja.

KOD KURSUS	KURSUS	KREDIT
LLE 3042	Basic Grammar and Vocabulary	-
	JUMLAH	-

Kursus Bahasa Asing yang ditawarkan adalah seperti berikut:

KOD KURSUS	KURSUS	KREDIT
LLF 3011	Foreign Language – Arabic I	1
LLF 3031	Foreign Language – Mandarin I	1
LLF 3051	Foreign Language – Russian I	1
LLF 3071	Foreign Language – French I	1
LLF 3091	Foreign Language – Spanish I	1
LLF 3021	Foreign Language – Arabic II	1
LLF 3041	Foreign Language – Mandarin II	1
LLF 3061	Foreign Language – Russian II	1
LLF 3081	Foreign Language – French II	1
LLF 3101	Foreign Language – Spanish II	1
	JUMLAH	2



KOD KURSUS	KURSUS	KREDIT
LLA 3011	Foreign Language – Arabic I	(+1)
LLA 3031	Foreign Language – Mandarin I	(+1)
LLA 3051	Foreign Language – Russian I	(+1)
LLA 3071	Foreign Language – French I	(+1)
LLA 3091	Foreign Language – Spanish I	(+1)
LLA 3021	Foreign Language – Arabic II	(+1)
LLA 3041	Foreign Language – Mandarin II	(+1)
LLA 3061	Foreign Language – Russian II	(+1)
LLA 3081	Foreign Language – French II	(+1)
LLA 3101	Foreign Language – Spanish II	(+1)
	JUMLAH	(+2)

Kursus Bahasa Asing Audit yang ditawarkan adalah seperti berikut:

Semua pelajar hanya wajib memilih satu set (Bahasa Asing yang sama untuk 2 semester) dari lima kursus Bahasa Asing yang ditawarkan.

#### SINOPSIS KURSUS TERAS UNIVERSITI

#### ASAS TATABAHASA DAN PERBENDAHARAAN LLE3042 BASIC GRAMMAR AND VOCABULARY LLE3042

Pass / Fail Pre-requisite :MUET Band 1 and 2

#### **Course Synopsis**

The course is designed for students who attained Bands 1 and 2 in the MUET examination. It focuses on the development of grammar and vocabulary of the students.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. *identify accurate grammatical rules.*
- 2. *demonstrate the ability to use accurate grammar in spoken and written discourse.*
- 3. apply accurate vocabulary in spoken and written discourse correctly.

#### References

- 1. Azar, B. S. (1996). *Basic English Grammar*. New Jersey: Prentice Hall Regents.
- 2. Hashemi, L. (1995). *English Grammar in Use Supplementary Exercises*. Cambridge: Cambridge University Press.
- 3. Ho Chui Chui. (2001) *A Comprehensive Workbook for Prepatory English*. Petaling Jaya: Prentice Hall.
- 4. Broukal, M. (2005). Grammar 2- Form and Function. Singapore: McGraw Hill.

#### **Other References**

- 1. Chantra Balasingam, Soo Kim Suwe & Rathabai Kunchiram. (2001). *Progressive English for Malaysian College Students*.
- 2. Jones, L. (1994). Communicative Grammar Practice- Activities for intermediate students of English. Melbourne: Cambridge University Press.



#### COURSE CODE : LLE 3012 COURSE NAME : ENGLISH FOR ACADEMIC WRITING BAHASA INGGERIS UNTUK PENULISAN AKADEMIK

2 Credit Hours Pre-requisite : None

#### Course Synopsis

This course aims to reinforce essay composition skills and introduce students to the practice of writing for academic purposes. It introduces and prepares students with basic research writing skills including: conducting research, note taking, paraphrasing, summarising, in-text referencing, positioning, and applying MLA or APA style citation. This course will place emphasis on composition skills such as: essay structure, coherence; and sentence structure

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. *illustrate great ability to read and comprehend academic texts of different genres in English.*
- 2. apply referencing techniques in writing, quoting, summarising and paraphrasing.
- 3. determine and differentiate point of views from different source.
- 4. produce coherent and cohesive extended essays in logical structures.

#### Main References

- 1. Latisha Asmaak Shafie, Mohamad Fadhili Yahaya, Mahani Mansor, Nazira Osman. (2017). English for Academic Writing. Malaysia: Oxford Fajar Sdn. Bhd.
- 2. Dollahite, N. E., & Haun, J. (2012). Sourcework: Academic Writing from Sources. Boston: Heinle/ Cengage Learning.

#### **Other References**

- 3. Naginder Kaur, & Noorazalia Izha Haron. (2015). Integrate Language Skills Writing. Selangor: Oxford Fajar Sdn. Bhd.
- 4. Nalini Arumugam, Dass, L.C., Masturah Alias, Naginder Kaur, Noorkhaida Abdul Murad, Surina Nayan. (2015). Step up Academic Writing Skills. Selangor: UiTM Press.
- 5. Pagel, L. G., & Norstrom, B. (2011). Proofreading & Editing Precision. Mason, OH: South-Western Cengage Learning.
- 6. Elder, J. (2008). Exercise your college reading skills: developing more powerful comprehension. New York, NY: McGraw-Hill Higher Education.
- 7. Langan, J. (2011). College Writing Skills. New York: McGraw-Hill.



#### COURSE CODE : LLE 3032 COURSE NAME : AL-GHAZALI'S DIALOGUE: ENGLISH COMMUNICATION DIALOG AL-GHAZALI: KOMUNIKASI BAHASA INGGERIS

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

The course focuses on building students' capability in English language to discuss, argue, and defend their thoughts based on selected case studies. They will also be taught the techniques of producing good spoken discourse (oral presentation). The course will also incorporate aspects of confidence building, visual aids preparations, and audience handling. Students will have substantial practice in speech delivery, whilst at the same time they will be trained to develop their critical thinking and problem solving skills.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. state and identify correctly the strategies for effective communication, presentation skills, and literary elements.
- 2. apply appropriate strategies for effective communication, presentation skills, and analytical tools to the selected case studies effectively.
- 3. analyse different issues in the selected case studies critically.

- 1. Chandran, S. (2015). Leadership in the Military. Kuala Lumpur. Centre for Leadership and Professional Development.
- 2. Holmes-Eber, P. and Mainz, M.J. (2014). Case Studies in Operational Culture. Berlin: Military Bookshop Publisher.



#### COURSE CODE : LLF 3011 COURSE NAME : FOREIGN LANGUAGE – ARABIC I BAHASA ASING – ARAB I

1 Credit Hour Pre-requisite : None

#### **Course Synopsis**

The Arabic Language is offered to students who have no prior knowledge of Arabic. The objectives of this course are to introduce students to the language and to equip them with the necessary language skills so as to enable them to speak, listen, read and write correctly in Arabic. In this course, various simple sentence structures, grammar and vocabulary will also be included so that the students will be able to communicate in simple daily conversations and in the selected communication situations.

#### Course Learning Outcomes

At the end of the course students are able to:

- 1. state about self and acknowledge others by greeting them in the target language.
- 2. *identify words and meanings in the target language.*
- 3. produce simple sentences in the target language in selected situations.

- 1. V. Abdur Raheem. (2012). Durus al-'Arabiyyah Li Ghairi al-Natiqina Biha, Arab Saudi. Penerbita Islmaic University al-Medinah al-Munawwarah.
- 2. Abdul Halim Muhammad. (2012), Al-Tadribat al-Sarfiyyah. Penebit UPM: Serdang.
- 3. Ghazi Al-Baytar, Mohd Puzhi Usop & Azlan Shaiful Baharum. (2011). Tourist Guide Book. Penerbit Ar-Risalah Product Sdn. Bhd.
- 4. Kamarul Shukri bin Mat Teh, et al. (2013). al-Itqan Fi Ta'allum Lughat al-Quran. Kuala Terengganu. Penerbit UniSZA.
- 5. Nur Hayati Che Hat, et al. (2014). al-Murshid Fi Ta'allum al-Lughat al-Arabiyyah. Kuala Terengganu: Penerbit UniSZA.
- 6. Rosli Othman. (2002). Al-Insya' al-Wafiy. Penerbitan Al-Madani: Gombak.
- 7. Al-Sheikh Mustafa al-Ghulayayni. (1989). Al-Durus Al-Arabiyyah. Egypt: Al-Maktabah Al-Misriyyah.



#### COURSE CODE : LLF 3031 COURSE NAME : FOREIGN LANGUAGE – MANDARIN I BAHASA ASING – MANDARIN I

1 Credit Hour Pre-requisite : None

#### **Course Synopsis**

The course is intended for students without any prior knowledge of Chinese Language and aims to lay a solid foundation for students' further study in Chinese language. The course emphasises on the basic oral in Mandarin language and is designed with close reference to the military language and terminology. It includes the basic Chinese phonetics (Hanyu Pinyin System), pronounciation, vocabulary as well as simple grammar. The knowledge of Chinese History, Culture and Geography will also be introduced at appropriate points. Students are expected to be able to master 150-200 vocabulary and communicate for general purposes at the end of the course.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. state about self and acknowledge others by greeting them in the target language.
- 2. discuss the elementary phonetics and phonology of the Pinyin System.
- 3. produce simple sentences in the target language in selected situations.

- 1. Zhu Xiaoxing, Yue Jianling, Lv Yuhong & Zhu Peiru. (2007). Menghayati Bahasa Mandarin. Beijing: Higher Education Press.
- 2. Jiao Huafu & Hong Yunzhi. (2007). Common Knowledge about Chinese Geography. Beijing: Higher Education Press.
- 3. Ren Qiliang & Shi Xu. (2007). Common Knowledge about Chinese Culture. Beijing: Higher Education Press.
- 4. Wang Kai et al. (2007). Common Knowledge about Chinese History. Beijing: Higher Education Press.
- 5. Kang Yuhua & Lai Siping. (2005). Conversational Chinese 301. Beijing: Beijing Language and Culture University Press.



#### COURSE CODE : LLF 3051 COURSE NAME : FOREIGN LANGUAGE – RUSSIAN I BAHASA ASING – RUSIA I

1 Credit Hour Pre-requisite : None

#### Course Synopsis

This beginner's Russian course is offered to students who have no prior knowledge of Russian. The objectives to this course are to introduce students to the language and to equip them with the necessary language skills so as to enable them to speak, listen, read and write correctly in Russian. In this course, various simple sentence structures, grammar and vocabulary will also be included so that the students will be able to communicate in simple daily conversations and function well in selected military communication situations.

#### Course Learning Outcomes

At the end of the course students are able to:

- 1. state about self and acknowledge others by greeting them in the target language.
- 2. apply written and printed alphabet systems in the target language.
- 3. analyse elementary sentences in the target language in selected situations.

- 1. С. А. Хавранина, А. И. Широченская. (2003). Русский язык в упражнениях, 12-ое издание, стереотипное. Издательство Русский Язык, Москва.
- Н. Б. Карабанова. (2002). Говорите Правильно, 2- ое издание, исправленное. Издетельство Русский Язык Курсы.
- 3. П. А. Лекант & Е. И. Диброва. (2002). Современный русский язык. Издательство Дрофа, Москва.



#### COURSE CODE : LLF 3071 COURSE NAME : FOREIGN LANGUAGE – FRENCH I BAHASA ASING – PERANCIS I

1 Credit Hour Pre-requisite : None

#### Course Synopsis

This beginner's French language course is offered to students who have no prior knowledge of French. The objectives of this course are to introduce students to the language and to equip them with the necessary language skills so as to enable them to speak, listen and read correctly in French. In this course, various simple sentence structures, grammar and vocabulary will also be included so that the students will be able to communicate in simple daily conversations. At the end of this course, students will be able to speak and read simple sentences in French.

#### Course Learning Outcomes

At the end of the course students are able to:

- 1. state about self and acknowledge others by greeting them in the target language.
- 2. *identify words and meanings in the target language.*
- 3. produce simple sentences in the target language in selected situations.

- 1. Wan Ikhlas Wan Mohtar. (2009). Méthode de Français. Kuala Lumpur: Penerbit Universiti Pertahanan Nasional Malaysia.
- 2. Mraz, C. (2011), Enavant, methode de francais pour les militaires. Intervenants FLE/FOS.DCSDI.
- 3. Marie-José Lopes & Jean-Thierry Le Bougnec. (2014).Totem 1 : méthode de français A1. Hachette Français Langue Etrangère, Paris Cedex 15, France.
- 4. Baylon, C., Campa, A., Mestreit, C., Murillo, J. & Tost, M. (2000). Forum: Méthode de Français 1. Hachette Livre, 43 quai de Grenelle, 75 905 Paris Cedex.



#### COURSE CODE : LLF 3091 COURSE NAME : FOREIGN LANGUAGE – SPANISH I BAHASA ASING – SEPANYOL I

1 Credit Hour Pre-requisite : None

#### **Course Synopsis**

The Spanish course for beginners is offered to students who have no prior knowledge of Spanish. The objectives of this course are to introduce students to the language and equip them with the necessary language skills so as to enable them to speak, listen, read and write. However, the main focus is to emphasise on basic speaking skills. Various simple sentence structures, grammar and vocabulary will also be included in order to enhance their ability to interact in simple daily conversations and function well in selected situations especially in military environments. The students will be evaluated based on classroom activities, coursework and the four language skills mainly listening, reading, speaking and writing.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. state about self and acknowledge others by greeting them in the target language.
- 2. *identify words and meanings in the target language.*
- 3. produce simple sentences in the target language in selected situations.

- 1. Dawson, L. M., Potowski. K. & Sobral, S. (2008). Dicho y hecho. 9th Edition. New York: John Wiley & Sons, Inc.
- 2. Hammit, G. (2004). Learn Spanish The Fast And Fun Way. China: Barron's.
- 3. Jose, M.D & Maria, F.N. (2006). Spanish for Educators. New York: McGraw-Hill Companies Inc.
- 4. Fernández, N.G & Sanchez, J. (1981). Español 2000 Nivel Elemental. Madrid: SGEL
- 5. Truscott, S.(1994). Easy Spanish Exercises Practise for Beginners. London: McGrawHill.

#### COURSE CODE : LLF 3021 COURSE NAME : FOREIGN LANGUAGE – ARABIC II BAHASA ASING – ARAB II

1 Credit Hour Pre-requisite : **ARABIC I LLF3011** 

#### Course Synopsis

The Arabic Language Course is offered to students who have already completed Arabic Language I. The objectives of this course are to introduce students to the language and to equip them with the necessary language skills so as to enable them to speak, listen, read and write correctly in Arabic. In this course, various sentence structures, grammar and vocabulary will also be included so that the students will be able to communicate in daily conversations and in selected communication situations.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. *identify various types of basic sentences in the target language.*
- 2. express basic sentences in the target language appropriately.
- 3. analyse basic conversations in the target language in selected situations.

- 1. V. 'Abdur-Raheem. (2012). Durus al-'Arabiyyah Li Ghairi al-Natiqina Biha, Arab Saudi. Penerbit Islamic University al-Medinah al-Munawwarah.
- 2. Abdul Halim Muhammad. (2012), Al-Tadribat al-Sarfiyyah. Penerbit UPM : Serdang.
- 3. Ghazi Al-Baytar, Mohd Puzhi Usop & Azlan Shaiful Baharum. (2011). Tourist Guide Book. Penerbit Ar-Risalah Product Sdn Bhd.
- 4. Kamarul Shukri bin Mat Teh, et al. (2013). al-Itqan Fi Ta'allum Lughat al-Quran. Kuala Terengganu. Penerbit UniSZA.
- 5. Nur Hayati Che Hat, et al. (2014). al-Murshid Fi Ta'allum al-Lughat al-Arabiyyah. Kuala Terengganu: Penerbit UniSZA.
- 6. Rosli Othman. (2002). Al-Insya' al-Wafiy. Penerbitan Al-Madani : Gombak.
- 7. Al-Sheikh Mustafa al-Ghulayayni. (1989). Al-Durus Al-Arabiyyah. Egypt: Al-Maktabah Al-Misriyyah.

#### COURSE CODE : LLF 3041 COURSE NAME : FOREIGN LANGUAGE – MANDARIN II BAHASA ASING – MANDARIN II

1 Credit Hour Pre-requisite : **MANDARIN I LLF3031** 

#### Course Synopsis

This course is intended for students who had taken Mandarin I and aims to strengthen the foundation of the target language. The course further emphasises on the basic oral in Mandarin language and is designed with close reference to the military language and terminology. It includes the basic Chinese phonetics (Hanyu Pinyin System), pronunciation, vocabulary as well as simple grammar. The knowledge of Chinese History, Culture and Geography will also be introduced at appropriate points. Students are expected to be able to master 150-200 vocabulary and communicate for general purposes at the end of the course.

#### Course Learning Outcomes

At the end of the course students are able to:

- 1. *identify various types of basic sentences in the target language.*
- 2. express basic sentences in the target language appropriately.
- 3. analyse basic conversations in the target language in selected situations.

- 1. Zhu Xiaoxing, Yue Jianling, Lv Yuhong & Zhu Peiru. (2007). Menghayati Bahasa Mandarin. Beijing: Higher Education Press.
- 2. Jiao Huafu & Hong Yunzhi. (2007). Common Knowledge about Chinese Geography. Beijing: Higher Education Press.
- 3. Ren Qiliang & Shi Xu. (2007). Common Knowledge about Chinese Culture. Beijing: Higher Education Press.
- 4. Wang Kai et al. (2007). Common Knowledge about Chinese History. Beijing: Higher Education Press.
- 5. Kang Yuhua & Lai Siping. (2005). Conversational Chinese 301. Beijing: Beijing Language and Culture University Press.

#### COURSE CODE : LLF 3061 COURSE NAME : FOREIGN LANGUAGE – RUSSIAN II BAHASA ASING – RUSSIA II

1 Credit Hour Pre-requisite : **RUSSIAN I LLF3051** 

#### Course Synopsis

This elementary Russian course is offered to students who have prior knowledge of Russian I. This is an elementary course to introduce the students to the uses of the cases of Russian language. It includes the Prepositional case, Accusative case, Dative case, reading, various exercises, useful vocabulary and basic conversations. The objectives of this course are to enable the students to understand the first 3 cases of Russian language, to write and speak correctly so that the students will be able to communicate in simple daily conversations and function well in selected military communication situations.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. *identify various types of basic sentences in the target language.*
- 2. express basic sentences in the target language appropriately.
- 3. analyse basic conversations in the target language in selected situations.

- 1. С. А. Хавранина & А. И. Широченская. (2003). Русский язык в упражнениях, 12-ое издание, стереотипное. Издательство Русский Язык, Москва.
- 2. Н. Б. Карабанова. (2002). Говорите Правильно, 2- ое издание, исправленное. Издетельство Русский Язык Курсы.
- 3. П. А. Лекант & Е. И. Диброва. (2002). Современный русский язык. Издательство Дрофа, Москва.

#### COURSE CODE : LLF 3081 COURSE NAME : FOREIGN LANGUAGE – FRENCH II BAHASA ASING – PERANCIS II

1 Credit Hour Pre-requisite : **FRENCH I LLF3071** 

#### Course Synopsis

This course is a continuation of French I, where students will continue to develop basic concepts in French language and culture including French pronunciation, grammar and customs. Students will enhance and further develop their use of French in a balanced development of four skills: listening, speaking, reading and writing. This course is enhanced by the use of audio visual materials for the purpose of exposing students to a contemporary broad based French culture.

#### Course Learning Outcomes

At the end of the course students are able to:

- 1. *identify various types of basic sentences in the target language.*
- 2. express basic sentences in the target language appropriately.
- 3. analyse basic conversations in the target language in selected situations.

- 1. Farah Farhana Awang. (2012). Methode de Français II. Kuala Lumpur: Penerbit Universiti, UPNM.
- 2. Regine Merieux et Yves Coiseau. (2004). Niveau I Connections. Les editions Didier, Paris.
- 3. Miquel, C. (2002). Vocabulaire progressif du Français avec 250 exercices. Paris:CLE International.
# COURSE CODE : LLF 3101 COURSE NAME : FOREIGN LANGUAGE – SPANISH II BAHASA ASING – SEPANYOL II

1 Credit Hour Pre-requisite : **SPANISH I LLF3091** 

# Course Synopsis

This course is the continuation of Spanish for beginners and the objectives are to focus on listening and speaking in specific situations such as shopping and bargaining, travelling and also including military terminology in selected situations. The students are expected to read and write simple sentences and able to communicate using various sentence structures. They will also be exposed to essays, poems and letters written in Spanish. Besides that, translation exercises will be included as part of classroom activities and students will be evaluated based on all four language skills which are reading, listening, speaking and writing.

# **Course Learning Outcomes**

At the end of the course students are able to:

- 1. *identify various types of basic sentences in the target language.*
- 2. express basic sentences in the target language.
- 3. analyse basic conversations in selected situations.

- 1. Dawson, L.M., Potowski. K & Sobral, S. (2008). Dicho y hecho. 9th Edition. New York: John Wiley & Sons, Inc
- 2. Hammit, G. (2004). Learn Spanish The Fast And Fun Way. China: Barron's.
- 3. Diaz, J.M & Maria, F.N. (2006). Spanish for Educators. New York: McGraw-Hill Companies Inc.
- 4. Fernández, N.G. & Sanchez, J. (1981). Español 2000 Nivel Elemental. Madrid: SGEL
- 5. Truscott, S.(1994). Easy Spanish Exercises Practise for Beginners. London: McGrawHill.



# COURSE CODE : LLA 3011 COURSE NAME : FOREIGN LANGUAGE – ARABIC I BAHASA ASING – ARAB I

1 Credit Hour Pre-requisite : None

# Course Synopsis

The Arabic Language is offered to students who have no prior knowledge of Arabic. The objectives of this course are to introduce students to the language and to equip them with the necessary language skills so as to enable them to speak, listen, read and write correctly in Arabic. In this course, various simple sentence structures, grammar and vocabulary will also be included so that the students will be able to communicate in simple daily conversations and in selected communication situations.

# Course Learning Outcomes

At the end of the course students are able to:

1. Apply grammatical rules and writing systems of the target language in simple texts appropriately.

- 1. V. Abdur Raheem. (2012). Durus al-'Arabiyyah Li Ghairi al-Natiqina Biha, Arab Saudi. Penerbita Islmaic University al-Medinah al-Munawwarah.
- 2. Abdul Halim Muhammad. (2012), Al-Tadribat al-Sarfiyyah. Penebit UPM: Serdang.
- 3. Ghazi Al-Baytar, Mohd Puzhi Usop & Azlan Shaiful Baharum. (2011). Tourist Guide Book. Penerbit Ar-Risalah Product Sdn. Bhd.
- 4. Kamarul Shukri bin Mat Teh, et al. (2013). al-Itqan Fi Ta'allum Lughat al-Quran. Kuala Terengganu. Penerbit UniSZA.
- 5. Nur Hayati Che Hat, et al. (2014). al-Murshid Fi Ta'allum al-Lughat al-Arabiyyah. Kuala Terengganu: Penerbit UniSZA.
- 6. Rosli Othman. (2002). Al-Insya' al-Wafiy. Penerbitan Al-Madani: Gombak.
- 7. Al-Sheikh Mustafa al-Ghulayayni. (1989). Al-Durus Al-Arabiyyah. Egypt: Al-Maktabah Al-Misriyyah.



# COURSE CODE : LLA 3031 COURSE NAME : FOREIGN LANGUAGE – MANDARIN I BAHASA ASING – MANDARIN I

1 Credit Hour Pre-requisite : None

# Course Synopsis

The course is intended for students without any prior knowledge of Chinese Language and aims to lay a solid foundation for students to further study in Chinese language. The course emphasises on the basic oral in Mandarin language and is designed with close reference to the military language and terminology. It includes the basic Chinese phonetics (Hanyu Pinyin System), pronounciation, vocabulary as well as simple grammar. The knowledge of Chinese History, Culture and Geography will also be introduced at appropriate points. Students are expected to be able to master 150-200 vocabulary and communicate for general purposes at the end of the course.

#### **Course Learning Outcomes**

At the end of the course students are able to:

1. Illustrate basic construction and stroke order of Mandarin writing system.

- 1. Zhu Xiaoxing, Yue Jianling, Lv Yuhong & Zhu Peiru. (2007). Menghayati Bahasa Mandarin. Beijing: Higher Education Press.
- 2. Jiao Huafu & Hong Yunzhi. (2007). Common Knowledge about Chinese Geography. Beijing: Higher Education Press.
- 3. Ren Qiliang & Shi Xu. (2007). Common Knowledge about Chinese Culture. Beijing: Higher Education Press.
- 4. Wang Kai et al. (2007). Common Knowledge about Chinese History. Beijing: Higher Education Press.
- 5. Kang Yuhua & Lai Siping. (2005). Conversational Chinese 301. Beijing: Beijing Language and Culture University Press.



# COURSE CODE : LLA 3051 COURSE NAME : FOREIGN LANGUAGE – RUSSIAN I BAHASA ASING – RUSIA I

1 Credit Hour Pre-requisite : None

#### Course Synopsis

This beginner's Russian course is offered to students who have no prior knowledge of Russian. The objectives to this course are to introduce students to the language and to equip them with the necessary language skills so as to enable them to speak, listen, read and write correctly in Russian. In this course, various simple sentence structures, grammar and vocabulary will also be included so that the students will be able to communicate in simple daily conversations and function well in selected military communication situations.

#### **Course Learning Outcomes**

At the end of the course students are able to:

1. Define all the morphological categories in the target language.

- 1. С. А. Хавранина, А. И. Широченская. (2003). Русский язык в упражнениях, 12-ое издание, стереотипное. Издательство Русский Язык, Москва.
- 2. Н. Б. Карабанова. (2002). Говорите Правильно, 2- ое издание, исправленное. Издетельство Русский Язык Курсы.
- 3. П. А. Лекант & Е. И. Диброва. (2002). Современный русский язык. Издательство Дрофа, Москва.



# COURSE CODE : LLA 3071 COURSE NAME : FOREIGN LANGUAGE – FRENCH I BAHASA ASING – PERANCIS I

1 Credit Hour Pre-requisite : None

# Course Synopsis

This beginner's French language course is offered to students who have no prior knowledge of French. The objectives of this course are to introduce students to the language and to equip them with the necessary language skills so as to enable them to speak, listen and read correctly in French. In this course, various simple sentence structures, grammar and vocabulary will also be included so that the students will be able to communicate in simple daily conversations. At the end of this course, students will be able to speak and read simple sentences in French.

# Course Learning Outcomes

At the end of the course students are able to:

1. Apply grammatical rules and writing systems of the target language in simple texts appropriately.

- 1. Wan Ikhlas Wan Mohtar. (2009). Méthode de Français. Kuala Lumpur: Penerbit Universiti Pertahanan Nasional Malaysia.
- 2. Mraz, C. (2011), Enavant, methode de francais pour les militaires. Intervenants FLE/FOS.DCSDI.
- 3. Marie-José Lopes & Jean-Thierry Le Bougnec. (2014).Totem 1 : méthode de français A1. Hachette Français Langue Etrangère, Paris Cedex 15, France.
- 4. Baylon, C., Campa, A., Mestreit, C., Murillo, J. & Tost, M. (2000). Forum: Méthode de Français 1. Hachette Livre, 43 quai de Grenelle, 75 905 Paris Cedex.



# COURSE CODE : LLA 3091 COURSE NAME : FOREIGN LANGUAGE – SPANISH I BAHASA ASING – SEPANYOL I

1 Credit Hour Pre-requisite : None

# Course Synopsis

The Spanish course for beginners is offered to students who have no prior knowledge of Spanish. The objectives of this course are to introduce students to the language and equip them with the necessary language skills so as to enable them to speak, listen, read and write. However, the main focus is to emphasise on basic speaking skills. Various simple sentence structures, grammar and vocabulary will also be included in order to enhance their ability to interact in simple daily conversations and function well in selected situations especially in military environments. The students will be evaluated based on classroom activities, coursework and the four language skills mainly listening, reading, speaking and writing.

#### **Course Learning Outcomes**

At the end of the course students are able to:

1. Apply grammatical rules of the target language in simple texts.

- 1. Dawson, L. M., Potowski. K. & Sobral, S. (2008). Dicho y hecho. 9th Edition. New York: John Wiley & Sons, Inc.
- 2. Hammit, G. (2004). Learn Spanish The Fast And Fun Way. China: Barron's.
- 3. Jose, M.D & Maria, F.N. (2006). Spanish for Educators. New York: McGraw-Hill Companies Inc.
- 4. Fernández, N.G & Sanchez, J. (1981). Español 2000 Nivel Elemental. Madrid: SGEL
- 5. Truscott, S.(1994). Easy Spanish Exercises Practise for Beginners. London: McGrawHill.

# COURSE CODE : LLA 3021 COURSE NAME : FOREIGN LANGUAGE – ARABIC II BAHASA ASING – ARAB II

1 Credit Hour Pre-requisite : **ARABIC I LLA3011** 

# Course Synopsis

The Arabic Language Course is offered to students who have already completed the Arabic Language I. The objectives of this course are to introduce students to the language and to equip them with the necessary language skills so as to enable them to speak, listen, read and write correctly in Arabic. In this course, various sentence structures, grammar and vocabulary will also be included so that the students will be able to communicate in daily conversations and in the selected communication situations.

# Course Learning Outcomes

At the end of the course students are able to:

1. Apply the correct grammar and vocabulary in basic conversations in the target language.

- 1. V. 'Abdur-Raheem. (2012). Durus al-'Arabiyyah Li Ghairi al-Natiqina Biha, Arab Saudi. Penerbit Islamic University al-Medinah al-Munawwarah.
- 2. Abdul Halim Muhammad. (2012), Al-Tadribat al-Sarfiyyah. Penerbit UPM : Serdang.
- 3. Ghazi Al-Baytar, Mohd Puzhi Usop & Azlan Shaiful Baharum. (2011). Tourist Guide Book. Penerbit Ar-Risalah Product Sdn Bhd.
- 4. Kamarul Shukri bin Mat Teh, et al. (2013). al-Itqan Fi Ta'allum Lughat al-Quran. Kuala Terengganu. Penerbit UniSZA.
- 5. Nur Hayati Che Hat, et al. (2014). al-Murshid Fi Ta'allum al-Lughat al-Arabiyyah. Kuala Terengganu: Penerbit UniSZA.
- 6. Rosli Othman. (2002). Al-Insya' al-Wafiy. Penerbitan Al-Madani : Gombak.
- 7. Al-Sheikh Mustafa al-Ghulayayni. (1989). Al-Durus Al-Arabiyyah. Egypt: Al-Maktabah Al-Misriyyah.

# COURSE CODE : LLA 3041 COURSE NAME : FOREIGN LANGUAGE – MANDARIN II BAHASA ASING – MANDARIN II

1 Credit Hour Pre-requisite : MANDARIN I LLA3031

# Course Synopsis

This course is intended for students who had taken Mandarin I and aims to strengthen the foundation of the target language. The course further emphasises on the basic oral in Mandarin language and is designed with close reference to the military language and terminology. It includes the basic Chinese phonetics (Hanyu Pinyin System), pronunciation, vocabulary as well as simple grammar. The knowledge of Chinese History, Culture and Geography will also be introduced at appropriate points. Students are expected to be able to master 150-200 vocabulary and communicate for general purposes at the end of the course.

# Course Learning Outcomes

At the end of the course students are able to:

1. Apply the correct grammar and vocabulary in basic conversations in the target language.

- 1. Zhu Xiaoxing, Yue Jianling, Lv Yuhong & Zhu Peiru. (2007). Menghayati Bahasa Mandarin. Beijing: Higher Education Press.
- 2. Jiao Huafu & Hong Yunzhi. (2007). Common Knowledge about Chinese Geography. Beijing: Higher Education Press.
- 3. Ren Qiliang & Shi Xu. (2007). Common Knowledge about Chinese Culture. Beijing: Higher Education Press.
- 4. Wang Kai et al. (2007). Common Knowledge about Chinese History. Beijing: Higher Education Press.
- 5. Kang Yuhua & Lai Siping. (2005). Conversational Chinese 301. Beijing: Beijing Language and Culture University Press.

# COURSE CODE : LLA 3061 COURSE NAME : FOREIGN LANGUAGE – RUSSIAN II BAHASA ASING – RUSSIA II

1 Credit Hour Pre-requisite : **RUSSIAN I LLA 3051** 

# **Course Synopsis**

This elementary Russian course is offered to students who have prior knowledge of Russian I. This is the elementary course to introduce the students to the uses of the cases of Russian language. It includes the Prepositional case, Accusative case, Dative case, reading, various exercises, useful vocabulary and basic conversations. The objectives of this course are to enable the students to understand the first 3 cases of Russian language, to write and speak correctly so that the students will be able to communicate in simple daily conversations and function well in selected military communication situations.

# Course Learning Outcomes

At the end of the course students are able to:

1. Apply grammar and vocabulary in basic conversations in the target language according to the rules of 3 cases of Russian grammar.

- 1. С. А. Хавранина & А. И. Широченская. (2003). Русский язык в упражнениях, 12-ое издание, стереотипное. Издательство Русский Язык, Москва.
- 2. Н. Б. Карабанова. (2002). Говорите Правильно, 2- ое издание, исправленное. Издетельство Русский Язык Курсы.
- 3. П. А. Лекант & Е. И. Диброва. (2002). Современный русский язык. Издательство Дрофа, Москва.

#### COURSE CODE : LLA 3081 COURSE NAME : BAHASA ASING – PERANCIS II FOREIGN LANGUAGE – FRENCH II

1 Credit Hour Pre-requisite : **FRENCH I LLA3071** 

# Course Synopsis

This course is a continuation of French I, where students will continue to develop basic concepts in French language and culture including French pronunciation, grammar and customs. Students will enhance and further develop their use of French in a balanced development of four skills: listening, speaking, reading and writing. This course is enhanced by the use of audio visual materials for the purpose of exposing students to a contemporary broad based French culture.

# Course Learning Outcomes

At the end of the course students are able to:

1. Apply the correct grammar and vocabulary in basic conversations in the target language.

- 1. Farah Farhana Awang. (2012). Methode de Français II. Kuala Lumpur: Penerbit Universiti, UPNM.
- 2. Regine Merieux et Yves Coiseau. (2004). Niveau I Connections. Les editions Didier, Paris.
- 3. Miquel, C. (2002). Vocabulaire progressif du Français avec 250 exercices. Paris:CLE International.

# COURSE CODE : LLA3101 COURSE NAME : FOREIGN LANGUAGE – SPANISH II BAHASA ASING – SEPANYOL II

1 Credit Hour Pre-requisite : **SPANISH I LLA3091** 

# Course Synopsis

This course is the continuation of Spanish for beginners and the objectives focus on listening and speaking in specific situations such as shopping and bargaining, travelling and also including military terminology in selected situations. The students are expected to read and write simple sentences and able to communicate using various sentence structures. They will also be exposed to essays, poems and letters written in Spanish. Besides that, translation exercises will be included as part of classroom activities and students will be evaluated based on all four language skills which are reading, listening, speaking and writing.

# **Course Learning Outcomes**

At the end of the course students are able to:

1. Apply the correct grammar and vocabulary in basic conversations in the target language.

- 1. Dawson, L.M., Potowski. K & Sobral, S. (2008). Dicho y hecho. 9th Edition. New York: John Wiley & Sons, Inc
- 2. Hammit, G. (2004). Learn Spanish The Fast And Fun Way. China: Barron's.
- 3. Diaz, J.M & Maria, F.N. (2006). Spanish for Educators. New York: McGraw-Hill Companies Inc.
- 4. Fernández, N.G. & Sanchez, J. (1981). Español 2000 Nivel Elemental. Madrid: SGEL
- 5. Truscott, S.(1994). Easy Spanish Exercises Practise for Beginners. London: McGrawHill.



# COURSE CODE : DUM 3022 COURSE NAME : MILITARY LEADERSHIP KEPIMPINAN KETENTERAAN

2 Credit Hours

Pre-requisite : None

#### **Course Synopsis**

The underlying theme of the course is that the military is very much a leader centric organization that prides on developing effective leaders. The effectiveness of leadership is not only measured by mission accomplishment but also team development to ensure ability to adapt to the peculiarities of any situation. The course will show that leadership styles need to be adapted to suit the demands of combat and the peculiarities of the organization. It shall focus on the fact that the leader must care for his people and equally care for the work to be done. The course will address effective leadership requirements at different organizational levels. Potential leaders shall be exposed to the importance of applying command or influence to accomplish the mission. The study mode shall emphasize the use of case studies to allow students to think out of the box and develop innovate and practical problem solving solutions to overcome challenging leadership scenarios.

# **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Understand the importance of leadership principles in managing people and organizations in the military and civilian arena.
- 2. Analyse the organization to determine if it is leader dominant or follower dominant and select the required leadership style.
- 3. Identify and develop (growing) potential leaders willing to accept the call to be team players in achieving organizational excellence.
- 4. Explore the connect between leader, his followers and the ability to adapt to situations.

- 1. Humphrey, R.H. (2014). Effective Leadership: Theory, Cases and Applications. Washington, DC: Sage Publications Inc. ISBN 978-1-4129-6355-8.
- 2. Manning George & Curtis Kent. The Art of Leadership, McGraw Hill International 4th.Edition, Boston US, 2012. ISBN 978-007-127628-3.
- 3. Daft Richard L. Daft & Andrew Pirola-Merio, The Leadership Experience, Asia Pacific Edition, Cengage Learning Australia Pty Ltd. 2009.
- 4. Andrew J. DuBrin, Principles of Leadership, South Western CENGAGE Learning, 6<sup>th</sup> Edition, US 2010.
- 5. Richard Hughes, Robert C Ginnett, Gordon J Curphy, Leadership, Enhancing the Lessons of Experience, McGraw Hill International, 6<sup>th</sup> Edition United States 2009.
- 6. Robert L Taylor, William E. Rosenbach, Eric B. Rosenbach Military Leadership In Pursuit of Excellence, 6 th. Edition Westview Press 2009.



# COURSE CODE : DUS 3012 COURSE NAME : MILITARY HISTORY SEJARAH KETENTERAAN

2 Credit Hours

Pre-requisite : None

#### **Course Synopsis**

This course will initially focus on the history of warfare before moving on to the various campaign and battle studies from the medieval period to the Cold War era. The focus would be on the development of war tactics and strategy, the roles of leaders, the potential and limitation of technology, and the political and social effects of these campaigns and the lessons that can be learned derived from them. A section will also be devoted to the history of counter-insurgency warfare and

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Acquire knowledge of the historical and technological development in warfare.
- 2. Acquire knowledge on history of the Malaysian Armed Forces.
- 3. Acquire knowledge on Malayan campaigns and counter insurgency operations.
- 4. *Identify traits of military leadership.*
- 5. Understand the involvement of Malaysia in peacekeeping operations.

#### References

- 1. Black, J. (2004). Rethinking Military History. London: Routledge.
- 2. Calnocoressi, P., Wint, G. & Pritchard, J. (1999). The Penguin History of the Second World War. London: Penguin.
- 3. Holmes, Richard, & Martin Marix Evans. (2007). Decisive Conflicts in History. Oxford: Oxford University Press.
- 4. Keegan, John. (1995). The Face of Battle. London: Viking Publications.
- 5. Townshend, C. (ed.) (2005). The Oxford History of Modern War. Oxford: Oxford University Press.
- 6. Nik Mohamed Nik Mohd Salleh. (2006). The Second World War In Kelantan: December 1941. Kuala Lumpur: United Selangor Press.
- 7. Nye, Joseph. S. Jr (2009). Understanding International Conflicts: An Introduction to Theory and History. New York: Pearson, Longman.
- 8. Abdul Razak Baginda, (ed.) (2009). Malaysia's Defence & Security Since 1957. MSRC. Kuala Lumpur: Printpack Sdn Bhd.
- 9. Khoo Kay Kim dan Adnan Hj. Nawang (ed.) (1984). Darurat 1948-1960. Kuala Lumpur.

United Selangor Press.

# COURSE CODE: DUS 3022COURSE NAME: INTRODUCTION TO STRATEGIC STUDIESPENGANTAR PENGAJIAN STRATEGI

2 Credit Hours

Pre-requisite : None

# **Course Synopsis**

The aim of the course is to expose students to the various concepts in the area of strategic studies such as military power, the philosophy of war, the employment of military, naval and air power as well as the concept of defence strategy and cooperation, nuclear strategy and terrorism. As foundation knowledge, student would also be introduced to the modern principal of war and teaching of selected Western and Oriental Strategic thinker.

# Course Learning Outcomes

At the end of the course students are able to:

- 1. Understand the fundamental concepts and theories in strategic studies.
- 2. Identify the significance applicability of scope in strategic studies.

- 1. Baylis, John et al. (2014). Strategy in the Contemporary World, 4<sup>th</sup>.Ed. : Oxford University Press.
- 2. Freedman, Lawrence (Ed.) (1994.) War. Oxford: Oxford University Press.
- 3. Mahnken, Thomas & Maiolo, Joseph, A. (2008). Strategic Studies: A Reader. London: Routledge.
- 4. Paret, Peter (Ed.). (1986). Makers of Modern Strategy from Machiavelli to the Nuclear Age. Oxford: Oxford University Press.
- 5. Williams, Phil, Donald Golstein, JaySharfritz. (2006). Classic Readings of International Relations, 3<sup>rd</sup> Ed. Fort Worth: Harcourt Brace.

#### COURSE CODE : DUS 3032 COURSE NAME : MILITARY LAW AND LAWS OF ARMED CONFLICT UNDANG-UNDANG TENTERA DAN UNDANG-UNDANG KONFLIK BERSENJATA

2 Credit Hours

Pre-requisite : None

# Course Synopsis

This course is divided into two parts; military law and law of armed conflict:

- 1. The first part of the course is to provide students with the basic foundation knowledge of military law, Armed Forces Act 1972 and other related documents in general. Students will initially be taught the various laws, regulations and procedures before being exposed to the various practical applications of law through discussions, exercises and class assignments.
- 2. The second part of the course is designed to introduce students to the laws of war covering both wars in conventional setting as well as non-conventional setting. In general, students will be exposed to the history of the development of the laws of war, as well as the religious and cultural dimensions of the laws. Apart of the focus of the subject will be the four Geneva Conventions of 1949 and the three Additional Protocol, there are other relevant conventions and customary laws to be exposed in general.

#### Course Learning Outcomes

At the end of this course students are able to:

- 1. Understand the history of Military Law, key sources of the law, legislations and relevant secondary sources of law and the relationship between the Armed Forces Act 1972, the Penal Code and other applicable federal law.
- 2. Understand the jurisdictional aspects, system and functions of military law.
- 3. Understand military administrative law.
- 4. Understand of operation law which consists of all laws affecting military operations, including laws of armed conflict.

- 1. Federal Constitution
- 2. Armed Forces Act 1972.
- 3. Armed Forces (Board Of Inquiry) Rules 1976.
- 4. Armed Forces (Court-Martial) Rules of Procedure 1976.
- 5. Armed Forces (Field Punishment) Regulations 1976.
- 6. Armed Forces (Imprisonment And Detention) Rules 1976.
- 7. Armed Forces (Summary Jurisdiction) Regulations 1976.
- 8. Armed Forces (Forfeiture And Restoration Of Forfeited Service) Regulations 2000.
- 9. Armed Forces (Terms Of Service Of Regular Forces) Regulations 2013.



- 10. 1949 Geneva Convention I for the Amelioration of the Wounded and Sick in the Armed Forces in the Field.
- 11. 1949 Geneva Convention II for the Amelioration of Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea.
- 12. 1949 Geneva Convention III Relative to the Treatment of Prisoners of War.
- 13. 1949 Geneva Convention IV Relative to the Protection of Civilian Persons in Time of War.
- 14. Protocol Additional to the Geneva Convention 1949, Relating to the Protection of Victims of International Armed Conflict (Protocol I).
- 15. Protocol Additional to the Geneva Convention 1949, Relating to the Protection of Victims of Non-International Armed Conflict (Protocol II).
- 16. Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Adoption of an Additional Distinctive Emblem (Protocol III) 8 December 2005.



COURSE CODE:MPU 3132COURSE NAME:APPRECIATION OF ETHICS AND CIVILIZATIONSPENGHAYATAN ETIKA DAN PERADABAN

2 Credit Hours

Pre-requisite : None

#### Course Synopsis

Kursus ini menerangkan tentang konsep etika daripada perspektif peradaban dan kebudayaan merentas bangsa. Ia bertujuan bagi mengenal pasti sistem, tahap perkembangan, kemajuan dan kebudayaan sesuatu bangsa dalam mengukuhkan kesepaduan sosial. Selain itu, perbincangan berkaitan isu-isu kontemporari dalam aspek ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban dapat melahirkan pelajar yang bermoral dan professional. Penerapan amalan pendidikan berimpak tinggi (HIEPs) yang bersesuaian digunakan dalam penyampaian kursus ini. Di hujung kursus ini pelajar akan dapat menghubungkan etika dan kewarganegaraan berminda sivik.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Menjelaskan konsep etika dan peradaban yang berbeza.
- 2. Membandingkan sistem, tahap perkembangan kemajuan sosial dan kebudayaan merentas bangsa.
- 3. Membincangkan isu kontemporari berkaitan ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban.

- 1. Shamsul Amri Baharuddin (Ed), (2012). Modul Hubungan Etnik (2nd ed). Bangi: Institut Kajian Etnik, UKM.
- 2. Cheng, Y. (2012) Islam and The Wisdom of Asian Religion. K. L: The Other Press.
- 3. Cheng, Y. (2012) Islam and Secularism: The Quest for A Unity of Knowledge. Kuala Lumpur: IIUM Press International Islamic University Malaysia.
- 4. Dugin, A. (2012). The Fourth Political Theory. London: Arktos.
- 5. Majid Fakhry. (1991). Ethical Theories in Islam. Leiden: J. J. Brill.
- 6. Falkowski, A. F. (1990). Moral Philosophy: Theories, Skills and Applications. Englewood Cliff. NJ: Prentice Hall.
- 7. Guenon. R. (2001). The Reign of Quantity and The Signs of The Times. (Lord Northbourne, Trans.) Hilsdale NY: Sophia Parennis. {Original Work Published 1945}.
- 8. Harai, Y. N. (2017) Homo Deus: A Brief History of Tomorrow. Australia: Harper Collins.
- 9. Mackinnon, B. (2015). Ethics: theory and Contemporary Issues (8th ed). Stamford, CT: Cengage Learning.
- 10. Mitchell, H. B. (2011). Roots of Wisdom: A Tapestry of Philosophical Traditions (6th ed). Wadsworth: Cengage Learning.
- 11. Maszlee Malik. (2017). Foundations of Islamic Governance: A Southeast Asian Perspective (1t ed). London & New York: Routledge.



COURSE CODE : MPU 3142 COURSE NAME : PHILOSOPHY AND CURRENTS ISSUES FALSAFAH DAN ISU SEMASA

2 Credit Hours

Pre-requisite : None

# Course Synopsis

Kursus merangkumi hubungan ilmu falsafah dengan Falsafah Pendidikan Kebangsaan dan Rukun Negara. Penggunaan falsafah sebagai alat untuk memurnikan budaya pemikiran dalam kehidupan melalui seni dan kaedah berfikir serta konsep insan. Topik utama dalam falsafah iaitu epistemologi, metafizik dan etika dibincangkan dalam konteks isu semasa. Penekanan diberi kepada falsafah sebagai asas bagi menjalin dialog antara budaya serta memupuk nilai sepunya. Di hujung kursus ini pelajar akan mampu melihat disiplin-disiplin ilmu sebagai satu badan ilmu yang komprehensif dan terkait antara satu sama lain.

#### Course Learning Outcomes

At the end of the course students are able to:

- 1. Menjelaskan isu semasa berlandaskan ilmu falsafah, Falsafah Pendidikan Kebangsaan dan Rukun Negara.
- 2. Menerangkan isu semasa berdasarkan aliran pemikiran utama dalam pelbagai aliran falsafah,
- 3. Menghuraikan isu semasa melalui perspektif perbandingan falsafah sebagai asas bagi menjalinkan dialog antara budaya.

- 1. Al-Attas, S. M Naquib. (1991). The Concept of Education in Islam. Kuala Lumpur: ISTAC.
- 2. Al-Faruqi, I. R. (1994). Al-Tawhid: Its Implications for Thought and Life (2nd Ed). Herndon: IIIT.
- 3. Philips, D. C. (Ed) (2014). Encyclopedia of Educational Theory and Philosophy (1st Ed). SAGE Publication.
- 4. Dzulkifli, A. R & Rosnani, H. (2019) Pentafsiran Baharu Falsafah Pendidikan Kebangsaan dan Pelaksanaannya Pasca 2020. Kuala Lumpur: IIUM Press.
- 5. Hospers, J. (1997). An Introduction to Philosophical Analysis (4th Ed). London: Routledge.
- 6. Mitchell, H. B. (2011). Roots of Wisdom: A Tapestry of Philosophical Traditions (6th Ed). Wadsworth: Cengage Learning.
- 7. Osman Bakar. (1999). The Classification of Knowledge in Islam. Cambridge, U. K: The Islamic Texts Society.
- 8. Rosnani Hashim (2017). Revitalization of Philosophy and Philosophical Inquiry in Muslim Education. Kull of Education, IIUM.
- 9. Solomon, R. C, & Higgins, K. M. (2010). The Big Questions: A Short Introduction to Philosophy (8th Ed) Wadsworth: Cengage Learning.
- 10. Weiming, T. & Ikeda, D. (2011). New Horizons in Eastern Humanism: Buddhism, Confucianism and The Quest for Global Peace, London: I. B. Tauris.



COURSE CODE : MPU 3212 COURSE NAME : BASIC ENTREPRENEURSHIP ASAS KEUSAHAWANAN

2 Credit Hours

Pre-requisite : None

# Course Synopsis

This course introduces students to the concept of entrepreneurship and skills, and information that entrepreneurs use to lead a business. The course examines key organizational attributes necessary for organizations to succeed in any business environment. These attributes include strategic planning, marketing, financing, legal matters and cash flow. Finally, the course is designed to help students build the skills to develop and write a good business plan.

# Course Learning Outcomes

At the end of the course students are able to:

- 1. Explain the fundamental concepts and principles of entrepreneurship and characteristics of entrepreneur.
- 2. Differentiate between entrepreneurs, managers, and leaders as change agents.
- 3. Apply general managerial methods and creativity to support decision making.
- 4. Develop and write a business model and business plan.
- 5. Construct team work in gathering, analysing and reporting on business ideas into proper planning.

- 1. Hisrich, R.D. and Peters, M.P. (2013). Entrepreneurship. 9th Edition. New York: Irwin McGraw-Hill.
- 2. Kuratko, D.F. (2008). Entrepreneurship: Theory, Process, Practice. 8th Edition. Ohio: South-Western.
- 3. Barringer, B.R. and Ireland, R.D. (2010). Entrepreneurship. Successfully launching new venture. 3rd Edition. Upper Saddle River, New Jersey: Prentice Hall.
- 4. Sodri Ariffin, Ismail Ab Wahab and Zarida Hambali. (2013). Fundamentals of Entrepreneurship. Malaysia: Oxford Fajar.



COURSE CODE : MPU 3312 COURSE NAME : NATIONHOOD IN WORLD POLITICS MPU 3312 KENEGARAAN DALAM POLITIK DUNIA

2 Credit Hours

Pre-requisite : None

#### Course Synopsis

The course will expose the students to complex issues that dominate world political theatres in the 20th and 21st centuries. Initially, students will be introduced to basic concepts in political science and sociology and to ideas and thought of philosophers and political thinkers like Plato (The Republic), Aristotle (Politics), Kautilya (Arthasastra), Machiavelli (The Prince), Marx (Das Capital), Al-Farabi (Al-Madinah Al-Fadillah), Ibnu Khaldum (Mukaddimah), Tun Sri Lanang (Sejarah Melayu) etc.; and how their ideas were crystallised into ideologies that were adopted by new nation-states of the 20th century. Then, students will be guided to understand on circumstances that led to the rise and collapse of Empires (Rome-Constantinople, Uthmanniah, British, Melaka, China, etc); the outbreak of the French Revolution, and First and Second World War (nationalism in the new nation- states) that gave rise to facists and dictators like Hilter, Mussolini, Stalin, etc. against democratic-liberalism of Anglo- American. Equipped with these conceptual tools and historical backdrop, students should be able to understand the politics of the Vietnam War, conflict in the Balkans, Palestine-Israel conflict, etc. which are manifestations of multiple fault lines that culminated into the new epoch of the Cold War, ethnic conflict or cleansing? clash of civilizations (S.Huntington), and other possibilities which should help them to develop their mind as "Intellectual Leader of character".

# Course Learning Outcomes

At the end of the course students are able to:

- 1. To educate students about the dynamics of the issue of patriotism that began from an empire to a nation-building.
- 2. To expose students to the history of the war based on ideology, ethnicity and civilization and the correlation in the construction of the nation and in the forms of feudal political system and current. (20th century and the 21<sup>st</sup>.
- 3. To expose students to different political ideologies in a country such as the communist ideology of Marxism, liberalism and democracy, dictators and military juntas and international political relations.
- To produce globally minded students and literacy knowledge of history and current politics is characterized by a charismatic intellectual leader (intellectual leaders of character).



- 1. Wan Hashim Wan Teh & Wan Norhasniah Wan Husin (2015). Nationhood in World Politics. Universiti Pertahanan Nasional Malaysia
- 2. Abdul Rasyid Moten & Syed Serajul Islam (2011). Introduction to Poltical Science. Singapore: Thomson
- 3. Segal, G. (1996). The World Affairs Companion: The Essential One-Volume Guide to Global Issues. Simon & Schuster.
- 4. Crowley, Roger. (2006). 1453: The Holy War for Constantinople and the Clash of Islam and the West (1453: Detik- detik jatuhnya Constantinople ke tangan muslim (terj) Jakarta, Alvabet (2007).
- 5. Emerson, Rupert (1962). From Empire to Nation: The Rise to Self-Assertion of Asian and African Peoples. Boston. Mass: Beacon Press.
- 6. Fukuyama, Francis. (1992). The End of History and The Last Man. New York: Avon Books.
- 7. Huntington, Samuel P. (1996). The Clash of Civilizations and The Remaking of World Order. New York: Simon & Schuster.



#### COURSE CODE : MPU 3322 COURSE NAME : BLUE OCEAN STRATEGY AND TOTAL DEFENCE FOREIGN STRATEGI LAUTAN BIRU DAN PERTAHANAN MENYELURUH (HANRUH)

2 Credit Hours

Pre-requisite : None

#### Course Synopsis

This course is introduced with the aim to equip students with the knowledge on Blue Ocean Strategy technique which is capable of horning the students' thinking skill including critical thinking skill and in solving many issues and conflicts. It also can be used to optimize the available opportunities to be more innovative and creative either during times of peace or conflict including war. It will also expose students to challenges as a military leader and the need to cooperate with other entities in government as well as in private sectors in order to strengthen the country national defense and security. Having understood the principles and tools of the Blue Ocean Strategy with example related to safety and security cluster, the concept of Malaysian Defence and Security, HANRUH (JUMLAH DEFENCE) will be introduced to broaden the students' understanding with the aim of strengthening it through the application of Blue Ocean Strategy.

#### Course Learning Outcomes

At the end of the course students are able to:

- 1. To impart the knowledge to the students on Blue Ocean Strategy and its importance in nation building in strengthening the national defense and security
- To evaluate student's ability to apply the Blue Ocean Strategy in defense and security aspects through case studies that are related to nation building and strengthening the country defense and security
- 3. To develop a foundation in strategic thinking among the students to the extent of being able assimilate in their future carrier.

- 1. Kim, W. C. & Mauborgne, R. (2005). Blue Ocean Strategy: From Theory to Practice. Harvard Business Review.
- 2. Malaysian Institute of Defence and Security. (2013). National Blue Ocean Strategy, Initiatives Undertaken by MINDEF and Armed Forces. Minda Cetak Sdn. Bhd: Kuala Lumpur.

COURSE CODE:MPU 3332COURSE NAME:FIQH KEUTAMAAN

2 Jam Kredit

Prasyarat : Tiada

# **Course Synopsis**

Kursus Fiqh Keutamaan atau lebih dikenali sebagai fiqh mencari keutamaan ini merupakan panduan dalam mencari hukum melalui kaedah-kaedah hukum yang perlu diberi keutamaan. Ia juga memberi didikan kepada para pelajar bagi menentukan perkara yang lebih utama dalam proses kehidupan seharian.

# **Course Learning Outcomes**

- 1. Memahami kaedah-kaedah asas yang bersesuaian dengan agama dan kehidupan yang perlu diberi keutamaan.
- 2. Berkemampuan menjelaskan perbezaan antara perkara yang perlu diberikan keutamaan dalam ibadah dan kehidupan.
- 3. Mampu memberikan pandangan yang kritis dalam sesuatu perkara ibadah dan kehidupan yang perlu diberi keutamaan.

#### References

1. Yusuf Al-Qaradhawi, Dr (2014). Fiqh Aulawiyyat. PTS Islamika Sdn. Bhd.



#### COURSE CODE : MPU3422 COURSE NAME : COMMUNITY SERVICE KHIDMAT KOMUNITI

2 Jam Kredit

Prasyarat : Tiada

# **Course Synopsis**

Kursus Khidmat Komuniti ini membincangkan penglibatan komuniti, penyediaan kertas cadangan dan penghasilan sumbangan kepada komuniti yang berkesan. Tujuan kursus ini adalah membentuk asas-asas kepimpinan, nilai-nilai murni serta membentuk budaya tanggungjawab kepada komuniti. Dalam menghasilkan keberkesanannya, kursus diterapkan dalam dua bentuk pengajian iaitu pendekatan dalam kelas dan kajian lapangan. Kedua-dua pendekatan ini mampu menghasilkan para pelajar yang seimbang antara teori dan pengalaman yang diperolehi ketika khidmat komuniti yang telah dilalui. Pada akhir kursus ini, sudah pasti pelajar akan diperkukuhkan dengan nilai-nilai murni, rasa tanggungjawab, kepimpinan dan seterusnya dapat membentuk budaya keprihatinan dan tanggungjawab kepada komuniti.

# Course Learning Outcomes

- 1. Memahami dan membentuk asas-asas nilai murni dan tanggungjawab kepada komuniti.
- 2. Menerapkan ciri-ciri kepimpinan berkesan dan membentuk budaya sukarelawan serta semangat berkumpulan dan di kalangan pelajar.
- 3. Mengaplikasikan asas-asas kepimpinan dan kemahiran, nilai dan tanggungjawab kepada komuniti.

- 1. Ali, H. (2002). Volunteerism and the Development of Malaysian Social Care Syste. International Council on Social Welfare.
- 2. Ab. Alim Abdul Rahim. (1994). Pengurusan kokurikulum. Kuala Lumpur: Fajar Bakti.
- 3. BITARA KPT, (Keluaran Khas, September 2012). Yayasan Sukarelawan Siswa (YSS): Medan Mahasiswa Tabur Bakti, 11.
- 4. Al-Faruqi, Ismail, R. (1994). Islam dan pembangunan. Kuala Lumpur: Dewan Bahasa dan Pustaka.
- 5. Ahmad Atory Hussain. (1983). Pengantar pentadbiran awam. Kuala Lumpur: Utusan Publications.
- 6. Arasoo, Vesudevan. T. (1987). Kegiatan kokurikulum penyeliaan dan pentadbiran. Kuala Lumpur: Fajar Bakti



# COURSE CODE:MPU3412COURSE NAME:HUMAN MOVEMENT SCIENCE

2 Credit Hours Pre-requisite: None

#### **COURSE SYNOPSIS:**

This course will discuss on the important concepts human movement science and to understand the structure and function of human body in response to various exercising conditions. It is also to understand the sports and scientific elements that effect human movement during sports activities. Besides, student also will discuss basic understanding on sports management, officiating and professional development relating to sports scenario in Malaysia. Besides regular lectures and reading, group discussions and presentations will be a part of the learning process.

#### **Course Learning Outcomes**

Upon completion of this course, students will gain knowledge on the concepts of science in sports and the ability to:

- 1. Define the concept of science in sports activities.
- 2. Describe the basic concept of physical training in sports activities.
- 3. Demonstrate the basic concept of physical training in sports activities.

- 1. Bompa, T.O. & Haff, G.G (2009). Periodization:Theory and Methodology of Training (5<sup>th</sup>ed.). Champaign, IL: Human Kinetics.
- 2. Magill, R.A (2007). Motor Learning: Concepts and Applications (8<sup>th</sup>ed.). New York, NY: McGraw-Hill.
- 3. Prentice, W.E. (2011). Principles of Athletic Training. New York : McGraw-Hill
- 4. Bradshaw, E. (2013). Analysing Technique, IL: Human Kinetics.
- 5. Pyke, F. (2013). Coaching Performance, IL: Human Kinetics
- 6. Pyke, F & Goodman (2013). Addressing Injuries and Illness, IL: Human Kinetics.



# AKADEMI LATIHAN KETENTERAAN



# SENARAI KAKITANGAN AKADEMI LATIHAN KETENTERAAN

BIL	NAMA	JAWATAN		
	MARKAS ALK			
1.	BRIG JEN ROZAINY BIN AHMAD RAPIEE @ AHMAD ROPIEE TUDM	KOMANDAN		
2.	KOL KAMARULZAMAN BIN MOHD YUNOS	TIMB KMDN		
3.	LT KOL ZANUDDIN BIN HUSSIN	PEG MEM		
4.	MEJ MOHD RAZALI BIN HASHIM	PS 2 KOORD		
5.	KAPT WAN MOHD FIRDAUS BIN WAN HUSSIN	AJUTAN		
	BLK			
6.	MEJ AHMAD FAIZAL BIN ABDUL LATIF	KJL		
7.	MEJ MOHD SHARIL BIN MISKAN	PS 2 TADBIR		
8.	LT KDR MOHD SURIASAM BIN MAHMOOD TLDM	PS 2 LATIH		
9.	KAPT MOHAMMAD AMINUL HAQ BIN MOHD GHAZALI	PS 3 TADBIR		
10.	KAPT MOHD SHAHIR BIN SHARIBUDIN TUDM	PS 3 UDARA		
11.	KAPT AMMAR HAZIQ BIN BADRI HISAM	PS 3 LATIH		
12.	LT MUHAMMAD NUR ARIFIN BIN RAHMAT TLDM	PS 3 KHIDMAT		
	PALAPES			
13.	MEJ MOHAMMAD SYAFFIK BIN YAHAYA	KETUA BN PALAPES		
14.	KAPT SHAMSUL AFIQ BIN SULAIMAN	PEG LATIH PALAPES		
15.	KAPT MOHD FADZRUL HAKIMI BIN SULAIMAN	PEG TADBIR PALAPES		
	KOMPENI TUAH			
16.	MEJ MOHD HAZIZI BIN HAMZAH	KK TUAH		
17.	KAPT KAMARUZZAMAN BIN KAMARUDDIN	PEN KK TUAH		
	KOMPENI JEBAT			
18.	MEJ ASLI BIN OSMAN	KK JEBAT		
19.	KAPT MOHD AMRAN BIN RAMLI	PEN KK JEBAT		
	KOMPENI LEKIR			
20.	MEJ ZUL IZUDDIN BIN ISMAIL TUDM	KK LEKIR		
21.	KAPT AZRYZAL BIN ARIFFIN	PEN KK LEKIR		
	KOMPENI LEKIU			
22.	MEJ MOHAMAD SAFAWI BIN PAIMAN	KK LEKIU		
23.	KAPT LUQMAN HAKIM BIN SAHAR	PEN KK LEKIU		
KOMPENI KASTURI				
24.	MEJ AHMAD MAKHZAN BIN MAT RAHIM	KK KASTURI		
25.	KAPT MOHD AZRUL NIZAM BIN AZAMI	PEN KK KASTURI		

KOMPENI NADIM				
26.	LT KDR ABD RAZAK BIN ABD RAHMAN TLDM	KK NADIM		
27.	KAPT MOHAMAD ELYAS BIN MOHD SHAFIE	PEN KK NADIM		



KOMPENI TUN PERAK			
28.	MEJ MOHD SHAUFI BIN DOLLAH	KK TUN PERAK	
29.	KAPT SYAHRUM BIN MOHD SABRI	PEN KK TUN PERAK	
	KOMPENI TUN TEJA		
30.	MEJ MARINA BINTI MAHMOOD TUDM	KK TUN TEJA	
31.	KAPT AMMAR HAZIQ BIN BADRI HISAM	PEN KK TUN TEJA/ PS 3 DARAT	
	P&PL/PIAWAIAN		
32.	MEJ HASMAWI BIN ABDULLAH HASHIM	KET CAW PIAWAIAN	
33.	MEJ MUHMAD ZAFFERI BIN SHAARI	PEG VALIDASI	
34.	MEJ RAZALI BIN MD DAUD	PEG PIAWAIAN	
	ВВК		
35.	MEJ MD RAFIZIN BIN KAMARUDIN	KET BBK	
	CAW PERUBATAN		
36.	MEJ (DR) MUHAMMAD SUHAILI BIN SATRI	PEG PERUBATAN	
	KAPT (DR) MUHAMMAD NOOR AZAM FARHAN BIN MOHD SAJALI	PEG PGAT	
	KUARTERMASTER		
37.	MEJ ZULHELMI BIN OMAR	KM	
	LOGISTIK		
38.	MEJ ROS FAZILAH BINTI JAMALLUDIN TUDM	PS 2 KEWANGAN	
39.	LT KDR SHAKILA FAHIRIN BINTI RAMLEE TUDM	PS 2 LOG	
40.	LT MUHAMMAD HAFIZ BIN TANZIZI TUDM	PS 3 LOG	
	AGAMA		
41.	MEJ (UST) HAIRULNIZAM BIN HAMID	PEG AGAMA	
	GAJI		
42.	KAPT MALINA BINTI MOHAMMAD ROSBI	PEG GAJI	
	WPK		
43.	KAPT MOHD SHAHRULIZANI BIN ISMAIL	P'RUS WPK	
PEJABAT NC			
44.	KAPT MARZUNAIDI BIN MARZUKI	ADC NC	
CAW KENDERAAN			
45.	KAPT VIGISVARI A/P THANNIMALAI	MWO	

# LATAR BELAKANG AKADEMI LATIHAN KETENTERAAN

Akademi Latihan Ketenteraan (ALK) bertangungjawab terhadap pengurusan, pentadbiran dan keperluan logistik bagi ketiga-tiga perkhidmatan Pegawai Kadet Universiti Pertahanan Nasional Malaysia (UPNM) sesuai dengan dasar dan polisi pembangunan latihan ketenteraan yang digariskan. Latihan ketenteraan yang diadaptasi serta diaplikasikan adalah dirancang dan digubal selari dengan pengajian akademik berteraskan kepada Rancangan Pengurusan Latihan (RPL) yang sistematik dan efisien. ALK juga bertanggungjawab dalam pelaksanaan Latihan Ketenteraan Umum (LKU) dan Tempur Tanpa Senjata (TTS) yang dilaksanakan sepanjang pengajian di UPNM.

LKU dilaksanakan pada setiap Sabtu yang membawa kepada sepuluh (10) jam kredit sepanjang pengajian. Kod bagi matapelajaran ALK adalah seperti berikut:

Bil	Kod	Nama Matapelajaran	Kredit	Sem	Catatan	
1	DUS 3012	Military History	2	1	Penilaian 30% ALK	
2	ALK 3112	General Military Training 1	2	2	Penilaian 100% ALK	
3	DUM 3022	Military Leadership	2	3	Penilaian 30% ALK	
4	DUS 3032	Military Law & Law Of Armed Conflict	2	4	Penilaian 30% ALK	
5	ALK 3122	General Military Training 2	2	5	Penilaian 100% ALK	
6	QKS 3172	Unarmed Combat	2	5	Penilaian 100% ALK	
7	EVV 3942	Survival	2	6	Penilaian 100% SLP*	

\*Sekolah Latihan Pegawai (SLP) KTU

TTS telah dilaksanakan di UPNM bermula pada bulan Ogos 2009. Tujuan latihan ini dijalankan adalah untuk memastikan Pegawai Muda yang bakal dikeluarkan oleh UPNM memiliki tali pinggang hitam TTS, mampu untuk mempertahankan diri di samping memupuk kerjasama dan disiplin yang tinggi. TTS turut diambil kira dalam jam kredit Pegawai Kadet UPNM dengan kod QKS 3172 yang membawa kepada dua (2) kredit. Pegawai Kadet wajib mendaftar matapelajaran ini pada semester kelima pengajian bagi tujuan pengijazahan.

Latihan TTS dilaksanakan pada setiap hari Jumaat. Latihan merangkumi pergerakan tumbukan, tangkisan, tendangan, serangan dan pemusnahan. Jurulatih TTS yang berpengalaman di bawah kelolaan Pusat Latihan Kor Polis Tentera Diraja (PULAPOT) mampu mendidik dan memastikan Pegawai Kadet menjadi lebih berdisiplin, tangkas dan berkeyakinan.

Bagi program Ijazah Muda Penerbangan (ZK61), kursus EVV 3942 adalah kursus elektif universiti yang perlu didaftar bagi menggantikan kursus QKS 3172 untuk tujuan bergraduat.



# RANCANGAN PENGURUSAN LATIHAN (PEGAWAI KADET)

## 1. **AM**

Rancangan Pengurusan Latihan (RPL) Pegawai Kadet UPNM disediakan adalah untuk membantu dan sebagai panduan kepada Akademi Latihan Ketenteraan dalam merancang dan seterusnya berupaya melaksanakan Latihan Ketenteraan Umum (LKU) dengan sistematik dan efisien. Ianya dihasilkan setelah diambilkira aspek-aspek kesesuaian masa yang ada, waktu pengajian akademik dan silibus subjek-subjek ketenteraan yang bersesuaian dalam usaha melahirkan seorang Pegawai Muda yang berketrampilan sesuai dengan falsafah penubuhan UPNM.

# 2. KONSEP LATIHAN

Latihan akan dilaksanakn secara menyeluruh di UPNM. Ianya dilaksanakan pada hari Sabtu semasa sesi pengajian akademik dan di sebelah petang hari Isnin hingga Khamis diperuntukkan untuk latihan sukan manakala latihan Tempur Tanpa Senjata (TTS) adalah sebelah petang hari Jumaat. Pada masa cuti semester 1 dan 2, latihan ketenteraan akan dilaksanakan secara sepenuh masa.

# 3. OBJEKTIF LATIHAN

Konsep latihan Pegawai Muda di UPNM adalah untuk melatih dan melahirkan Pegawaipegawai Muda yang berilmu, berakhlak mulia, mengamalkan budaya ketenteaan, cekap dan menyumbang ke arah pembangunan ketenteraan dan negara. Justeru, RPL yang dibangunkan adalah bersesuaian dangan tahap pembelajaran dan pengetahuan yang ingin dicapai di akhir tahun-tahun pengajian dan latihan seerti berikut:

#### 3.1 Latihan Tunas Wira (LTW)

Latihan ini dirangka selama 6 minggu bagi memberikan landasan yang asas dalam ilmu ketenteraan kepada Pegawai Kadet yang baru melapor diri ke UPNM sebelum memulakan pengajian. Objektif latihan fasa ini adalah seperti berikut:

- 3.1.1 Memberikan pendedahan ke atas aspek-aspek kehidupan regimental ketenteraan dalam usaha membentuk perwatakan dan keperibadian serta disiplin ketenteraan.
- 3.1.2 Mengurangkan impak kejutan budaya.
- 3.1.3 Membina ketahanan fizikal, mental dan keyakinan diri sebagai persediaan untuk menjalani latihan ketenteraan seterusnya.
- 3.1.4 Memberi pendedahan kepada sistem latihan dan pengajian di UPNM.

# 3.2 Tahun Satu

Silibus Pelajaran ini bertujuan memberi pendedahan ke atas aspek-aspek ketenteraan dalam usaha membina perwatakan dan keperibadian sebagai seorang Pegawai Tentera. Objektif-objektif yang digariskan adalah seperti berikut:

- 3.2.1 Membentuk perwatakan dan keperibadian sebagai seorang Pegawai Tentera melalui aktiviti-aktiviti rejimental.
- 3.2.2 Memberi pendedahan ke atas aspek teknik dan taktik serta kepimpinan di peringkat kompeni.



#### 3.3 Tahun Dua

Silibus pelajaran yang dibangunkan untuk tahun ini adalah kesinambungan dari Tahun Satu dan bertujuan memberi pendedahan ke atas aspek-aspek ketenteraan dalam usaha membina perwatakan dan keperibadian sebagai seorang Pegawai Tentera. Objektif-objektif yang digariskan adalah seperti berikut:

- 3.3.1 Memahami organisasi dan tugas-tugas di peringkat Batalion dan Briged.
- 3.3.2 Memberi pendedahan ke atas aspek pentadbiran di peringkat organisasi ketenteraan.

#### 3.4 Tahun Tiga

Tahun ketiga merupakan tahun akhir bagi Pegawai Kadet yang mengikuti pengajian sains dan akademik Jurusan Sains dan Teknologi Pertahanan dan Jurusan Pengurusan Pertahanan. Silibus pelajaran yang dibangunkan untuk tahun ini bertujuan memberi pendedahan ke atas aspek-aspek ketenteraan dalam usaha memperlengkapkan seorang Pegawai Kadet yang mampu melaksanakan tugastugas seorang Pegawai Muda. Justeru, latihan peringkat kolektif akan diteruskan dan objektif-objektif yang digariskan adalah seperti berikut:

- 3.4.1 Berupaya melaksanakan tugas sebagai seorang Pegawai Muda.
- 3.4.2 Membentuk perwatakan dan keperibadian seorang Pegawai Tentera melalui aktiviti-aktiviti rejimental.



# **PALAPES**

# RANCANGAN RANCANGAN PENGURUSAN LATIHAN PASUKAN LATIHAN PEGAWAI SIMPANAN (PALAPES)

#### 1.0 AM

Pasukan Latihan Pegawai Simpanan (PALAPES) secara rasmi ditubuhkan pada Feb 1980, di antara dasar kerjasama pihak Kementerian Pertahanan dengan Kementerian Pengajian Tinggi Malaysia. PALAPES dilahirkan dengan iktizam sebagai satu program nasional yang berperanan untuk melatih bakal-bakal pegawai lepasan IPTA dalam pertahanan negara.

# 2.0 ASAS PENUBUHAN

Penubuhan PALAPES di semua IPTA adalah berasaskan kepada:

- i. Kesedaran dan kepercayaan bahawa IPTA-IPTA dalam negara ini mempunyai potensi besar sumber tenaga manusia yang berkelayakan akademik tinggi dan boleh memberi sumbangan besar terhadap keperluan pertahanan negara.
- ii. Kepercayaan berasaskan kelulusan akademik yang sedia ada pada mereka, mahasiswa-mahasiswi ini boleh dijadikan pegawai simpanan yang dinamik serta berdedikasi jika diberi bimbingan serta latihan ketenteraan yang sesuai.
- iii. Program latihan yang diberikan kepada mahasiswa-mahasiswi, selain dari melengkapkan mereka sebagai pegawai simpanan bagi Tentera Darat, juga membantu IPTA khususnya dan negara amnya dalam membentuk ciri-ciri ketahanan nasional.

# 3.0 TUJUAN

PALAPES ditubuhkan bertujuan untuk melatih dan mengeluarkan pegawai-pegawai simpanan sukarela dalam ATM.

#### 4.0 OBJEKTIF PALAPES

Objektif PALAPES penubuhan seperti berikut:

- i. PALAPES ditubuhkan dengan tujuan melatih pelajar-pelajar IPTA dalam ilmu ketenteraan bagi membina insan berdisiplin dan bersemangat waja.
- ii. Menyediakan sumber tenaga pegawai lepasan IPTA untuk Angkatan Tetap dan Angkatan Simpanan ATM.
- iii. Menyiapkan warganegara yang terlatih dalam bidang ketenteraan bagi mengukuhkan pertahanan negara dan ketahanan nasional.



#### 5.0 KURIKULUM LATIHAN PROGRAM PALAPES

Objektif latihan PALAPES adalah untuk membentuk peradaban, kualiti kepimpinan dan pengetahuan asas ketenteraan untuk menghasilkan pegawai muda yang berketerampilan dan berwawasan. Penekanan latihan ditumpukan kepada meningkatkan pengetahuan, kemahiran dan sikap individu berkumpulan.

# 6.0 OBJEKTIF PENDUKUNG

Bagi memastikan tercapainya objektif latihan PALAPES secara lebih dinamik dan efektif, beberapa aspek khusus telah dirumuskan untuk dijadikan objektif pendukung. Objektif ini akan memainkan peranan penting sebagai panduan dan pendorong ke arah matlamat yang diperlukan. Objektif pendukung ini dibahagikan kepada bidang-bidang tertentu seperti berikut:

# 6.1 <u>Pengetahuan Ketenteraan</u>

Memberi pengetahuan asas ketenteraan yang diperlukan oleh setiap pegawai muda bagi meninggikan dan meningkatkan taraf profesionalisme sebagai seorang pegawai di dalam TD Malaysia yang menjawat jawatan Ketua Platun Infantri atau setaraf.

# 6.2 Kemahiran Ketenteraan

Memberikan kemahiran asas ketenteraan yang akan diutamakan kepada aspek pengendalian senjata individu dan teknik asas taktik.

#### 6.3 Kepimpinan

Menanam dan memupuk semangat ketenteraan yang tulen dengan menitikberatkan kepada daya kepimpinan, kewibawaan, bertatatertib tinggi, tekun dan bersifat taat setia yang tidak berbelah bagi kepada organisasi yang dianggotai.

#### 6.4 Ketahanan Fizikal

Mempunyai ketahanan fizikal dan mental yang mantap serta memupuk semangat keyakinan diri, cergas dan segak sejajar sebagai tentera terlatih.

### 7.0 KONSEP LATIHAN

Latihan PALAPES dilaksanakan selama tiga tahun. Tahun pertama adalah Peringkat Junior, tahun kedua adalah Peringkat Intermediate dan tahun ketiga adalah Peringkat Senior. Pada dasarnya, jenis latihan yang dijalankan di PALAPES adalah mirip kepada latihan kadet angkatan tetap ATM sebagaimana yang dilaksanakan di ALK dan ATD. Bagi membolehkan setiap pegawai kadet melaksanakan latihan secara progresif, PALAPES ditetapkan untuk melaksanakan latihan seperti yang dibenarkan berdasarkan Buku Panduan Askar Wataniah 1988. Jenis-jenis latihan yang dijalankan oleh PALAPES adalah seperti berikut:



# 7.1 <u>Latihan Tempatan (LT)</u>

: 240 jam setahun.

Semua mata pelajaran berdasarkan peringkat masing-masing diajar semasa Latihan Tempatan. Hari latihan yang dirancangkan adalah mengikut kelapangan pegawai kadet atau hari ko-kurikulum UPNM bagi mencapai kehadiran maksimum. Bagi membolehkan catuan percuma diberi, latihan yang dijalankan hendaklah tidak kurang dari 10 jam.

# 7.2 Latihan Lanjutan/Berterusan (LL/LB) : 14 hari setahun.

PALAPES diberi tanggungjawab untuk merancang Latihan Lanjutan/Berterusan bagi keperluan mengulangkaji pelajaran-pelajaran yang memerlukan penekanan lanjut. Setiap latihan yang dijalankan hendaklah tidak kurang dari 72 jam (3 hari). Antara silibus latihan yang boleh dilaksanakan di dalam LL/LB adalah seperti berikut:

- i. Membaca Peta.
- ii. Latihan Menembak.
- iii. Latihan Kawad.
- iv. Latihan Ketenteraman Awam.
- v. Latihan Semboyan.

# 7.3 Latihan Khemah Tahunan (LKT) : 15 hari setahun.

LKT merupakan kemuncak bagi segala latihan yang dijalankan setiap tahun. Di dalam latihan ini, semua pegawai kadet akan diuji dan dinilai dalam aspek teori dan praktikal di atas apa jua pelajaran yang telah dipelajari. Penilaian seragam akan dilaksanakan terhadap semua pegawai kadet di semua PALAPES IPT. Semua pegawai kadet dikehendaki mengikut latihan berdasarkan latihan peringkat masing-masing. Rancangan penilaian dan aktiviti LKT yang seragam bagi semua PALAPES IPT adalah seperti yang ditetapkan oleh Tim Penilai LKT yang dikendalikan oleh MK Latihan TD.

#### 8.0 PERINGKAT LATIHAN

Latihan PALAPES akan dilaksanakan dalam jangkamasa tiga tahun berdasarkan peringkat berikut:

- i. Tahun 1 (Peringkat *Junior*) Untuk mencapai sebagai seorang soldadu terlatih.
- ii. Tahun 2 (Peringkat *Intermediate*) Untuk mencapai sebagai seorang PTT.
- iii. Tahun 3 (Peringkat *Senior*)Untuk mencapai sebagai seorang Pegawai Sukarela.



#### 9.0 SISTEM PENILAIAN DAN PEMARKAHAN

Sistem Penilaian dan Pemarkahan akan menggunakan panduan penilaian semasa yang dikeluarkan oleh MK Latihan TD.

# 10.0 STRUKTUR KURSUS

#### KURSUS ELEKTIF UNIVERSITI

Semua pelajar Program Sarjana Muda wajib melengkapkan enam (6) kredit Kursus Elektif Universiti. Pelajar-pelajar awam yang sihat tubuh badan diwajibkan menyertai PALAPES bagi mencukupkan enam (6) kredit

CODE	COURSE	CREDIT			
	Pelajar Layak PALAPES				
KOMPONEN KESUKARELAWAN					
PLS 3111	RESERVE OFFICERS TRAINING UNIT (ROTU) 1	1			
PLS 3121	RESERVE OFFICERS TRAINING UNIT (ROTU) 2	1			
PLS 3131	RESERVE OFFICERS TRAINING UNIT (ROTU) 3	1			
PLS 3141	RESERVE OFFICERS TRAINING UNIT (ROTU) 4	1			
PLS 3151	RESERVE OFFICERS TRAINING UNIT (ROTU) 5	1			
PLS 3161	RESERVE OFFICERS TRAINING UNIT (ROTU) 6	1			
	TOTAL	6			

#### 11.0 PENUTUP

Perancangan program latihan akan disesuaikan dengan kalendar tahunan universiti supaya ia tidak membebankan penuntut. Ini adalah kerana matlamat utama siswa-siswi ialah pencapaian yang cemerlang dalam pengajian akademik seiring dengan pengetahuan ketenteraan.


# KO-KURIKULUM BERKREDIT UNIVERSITI

# BAHAGIAN HAL EHWAL PELAJAR DAN ALUMNI

#### VISI

Menjadi bahagian yang unggul dalam menerajui perkhidmatan dan pembangunan pelajar untuk melahirkan *leaders of character* secara holistik.

#### MISI

Melahirkan graduan yang berdaya saing dan berintegriti dalam bidang pertahanan yang dapat menyumbang kepada pembangunan dan kemajuan negara.

#### OBJEKTIF

- i. Memberi perkhidmatan terbaik dalam memastikan kesejahteraan pelajar terjamin.
- ii. Menyediakan platform bagi pembangunan sahsiah diri untuk melahirkan pelajar yang berkualiti.
- iii. Meneruskan kesinambungan perhubungan ukhuwah antara alumni dan pihak universiti.
- iv. Memastikan persekitaran kampus yang kondusif kepada pelajar.
- v. Menanamkan sifat satu (1) UPNM.

#### мото

Bersama Menjana Keunggulan

# PENDAHULUAN

Universiti Pertahanan Nasional Malaysia mengambil langkah positif dengan memberikan kredit kepada aktiviti ko-kurikulum. Matlamat memberikan kredit kepada aktiviti ini jelas membayangkan hasrat Universiti yang beriltizam terhadap kecemerlangan dalam pendidikan bagi membina dan melahirkan pelajar yang berkebolehan dan seimbang.

Kursus-kursus Ko-kurikulum Berkredit ditawarkan berdasarkan kepada lapan (8) teras aktiviti ko-kurikulum selaras dengan Pelan Strategik Pengajian Tinggi Negara (PSPTN) yang dilancarkan pada 27 Ogos 2007 yang telah menyediakan ruang bagi perubahan dan anjakan paradigma dalam konteks penyampaian dan penaksiran kursus ko-kurikulum di IPT di bawah Pelan Tindakan Transformasi Pengajian Tinggi Negara, Kementerian Pengajian Tinggi Malaysia. Teras-teras tersebut adalah:

- i. Komponen Pengucapan Awam
- ii. Komponen Kebudayaan
- iii. Komponen Kesukarelawanan
- iv. Komponen Keusahawanan
- v. Komponen Daya Usaha & Inovasi
- vi. Komponen Khidmat Komuniti
- vii. Komponen Kepimpinan

# LATAR BELAKANG

Pelajar-pelajar kategori awam di Universiti Pertahanan Nasional Malaysia diwajibkan untuk mencukupkan enam (6) kredit bagi kursus Ko-kurikulum Berkredit. Enam (6) kredit tersebut dikategorikan di bawah Elektif Universiti (EU).

Pelajar-pelajar awam yang sihat tubuh badan dan menepati syarat-syarat sebagai Kadet Pegawai Latihan Pasukan Simpanan (PALAPES) adalah **DIWAJIBKAN** mengambil enam (6) kredit pasukan beruniform PALAPES bagi memenuhi kelayakan bergraduat.

Bagi pelajar-pelajar awam yang **TIDAK LAYAK** menyertai pasukan beruniform PALAPES hendaklah mengambil Kursus Ko-Kurikulum Berkredit Universiti yang telah ditawarkan sebanyak tiga (3) kursus di sepanjang pengajian bagi memenuhi kelayakan bergraduat sebanyak enam (6) kredit. Pelajar boleh memilih mana-mana subjek Ko-kurikulum Berkredit yang ditawarkan daripada Pengucapan Awam, Kebudayaan, Kesukarelawanan, Keusahawanan, Daya Usaha Dan Inovasi, Khidmat Komuniti dan Kepimpinan.

Kursus PALAPES akan berjalan sepanjang semester (bermula pada semester 1 sehingga semester 6) iaitu pada setiap hari Sabtu dan Ahad berserta dengan Kem Tahunan yang akan dijalankan oleh PALAPES.

Kursus Ko-kurikulum Berkredit bagi pelajar-pelajar yang tidak layak menyertai PALAPES, waktu kursus akan dikendalikan pada setiap hari Jumaat sepanjang semester bermula dari jam tiga (3) petang hingga jam enam (6) petang.

# DASAR KO-KURIKULUM

Pihak Universiti telah menetapkan Kursus Ko-kurikulum Berkredit sebagai sebahagian daripada komponen wajib bagi program pengajian di peringkat Sarjana Muda. Adalah menjadi harapan agar Kursus Ko-kurikulum Berkredit ini dapat memupuk, mengasah dan meningkatkan bakat pelajar UPNM supaya dapat melahirkan graduan yang seimbang, mampu menangani cabaran di dunia pekerjaan dan maju diperingkat antarabangsa.

#### MATLAMAT KO-KURIKULUM

Membantu Universiti dalam melahirkan siswazah berketerampilan seimbang dan harmonis di dalam aspek-aspek rohani intelektual, emosi, sosial dan fizikal sejajar dengan hasrat UPNM melahirkan *Intelectual Leaders of Character.* 

## **OBJEKTIF KURSUS KO-KURIKULUM BERKREDIT**

- 1. Menerapkan elemen Kemahiran Insaniah kepada pelajar sebagai nilai tambah di samping kelayakan akademik mereka.
- 2. Membantu pelajar membina diri di dalam aspek kepimpinan, kemahiran komunikasi berkesan, pemikiran kreatif, kritis dan berinovasi serta dapat mengaplikasikan pemahaman serta pengetahuan baharu untuk kemajuan diri.
- 3. Menggalakkan pelajar melibatkan keupayaan untuk meneroka peluang dan membangunkan kesedaran tentang risiko, kreativiti dan inovasi supaya dapat memenuhi ekspektasi majikan terhadap kualiti graduan yang bakal memasuki pasaran pekerjaan.
- 4. Melahirkan pelajar yang sentiasa mengamalkan etika moral yang tinggi dalam amalan profesional dan interaksi sosial.
- 5. Melahirkan pelajar yang peka terhadap perkembangan semasa dan dapat mengadaptasi diri selari dengan perkembangan tersebut menggunakan kemahiran yang telah dipelajari.

# PENDAFTARAN KURSUS

- 1. Kursus Ko-kurikulum Berkredit adalah salah satu daripada kursus wajib di Universiti.
- 2. Pelajar wajib mendaftar Kursus Ko-kurikulum Berkredit untuk memenuhi struktur pengajian mengikut syarat-syarat pengijazahan.
- 3. Struktur bagi Kursus Ko-kurikulum Berkredit adalah seperti berikut:
  - i. Pelajar akan menyelesaikan Kursus Ko-kurikulum Berkredit ini di antara semester satu (1) hingga semester enam (6). Namun begitu, pelajar adalah digalakkan dan disarankan untuk menyelesaikan Kursus Ko-kurikulum Berkredit di awal pengajian bagi mengurangkan beban pembelajaran di tahun akhir.
  - ii. Pelajar yang mendaftar Kursus Ko-kurikulum Berkredit PALAPES wajib meneruskan kursus tersebut selama enam (6) semester bermula dari semester satu (1) sehingga semester enam (6).
  - iii. Oleh kerana Kursus Ko-kurikulum Berkredit ini merupakan kursus berkredit, maka ianya tertakluk kepada peraturan akademik program Ijazah Sarjana Muda UPNM. Pelajar dinasihatkan supaya sentiasa merujuk kepada buku panduan akademik UPNM.



# PELAKSANAAN KURSUS

- Kursus Ko-kurikulum Berkredit akan dijalankan pada setiap hari Jumaat mulai jam 3.00 petang hingga 6.00 petang di sepanjang semester iaitu empat belas (14) minggu pembelajaran.
- 2. Kapasiti pelajar bagi satu kumpulan Kursus Ko-kurikulum Berkredit adalah di antara lima belas (15) pelajar tahap minimum sehingga tiga puluh (30) pelajar tahap maksimum bagi sesebuah kelas. Ini adalah untuk memastikan penyampaian dan pengajaran dapat dilaksanakan dengan berkesan di antara pelajar dan jurulatih/fasilitator serta objektif Kursus Ko-kurikulum Berkredit dapat dicapai.
- 3. Sekiranya jumlah pelajar yang mendaftar subjek ko-kurikulum kurang daripada lima belas (15) pelajar, subjek tersebut tidak akan ditawarkan dan pelajar-pelajar yang telah mendaftar dinasihatkan untuk mengambil subjek Kursus Ko-kurikulum Berkredit yang lain.

#### PENILAIAN PRESTASI PEMBELAJARAN

1. Setiap kursus dinilai berdasarkan empat kriteria iaitu buku log, kehadiran dan penglibatan, amali dan kemahiran insaniah. Berikut merupakan pembahagian pemberatan bagi kriteria yang dinilai:

BIL	PENILAIAN	MARKAH
1.	Buku Log	10%
2.	Kehadiran dan Penglibatan	30%
3.	Amali	30%
4.	Kemahiran Insaniah	30%

- Penilaian buku log adalah bertujuan mendorong pelajar untuk mendapatkan maklumat tambahan melalui pelbagai sumber dan meningkatkan refleksi (komunikasi intrapersonal).
- Kehadiran dan penglibatan pelajar semasa menjalankan teori dan amali adalah amat dititikberatkan. Pelajar-pelajar yang telah mendaftar subjek Kursus Ko-kurikulum Berkredit wajib menghadiri kelas yang telah ditetapkan.
- 4. Pelajar yang tidak hadir perlu mengemukakan surat/bukti kepada fasilitator.
- 5. Penilaian amali pula bertujuan untuk mengukur sejauh mana kefahaman para pelajar terhadap pembelajaran yang telah dipelajari mengikut rancangan pengajaran. Penilaian amali boleh dijalankan di dalam bentuk penganjuran aktiviti dan penilaian secara individu atau berkumpulan.
- Penilaian kemahiran insaniah adalah berdasarkan kepada pemerhatian terhadap sikap dan tingkah laku pelajar di dalam menguasai Kemahiran Insaniah yang akan dinilai oleh jurulatih/fasilitator.



# PENGGREDAN

- 1. Nilai gred akan diberikan kepada pelajar-pelajar Kursus Ko-kurikulum Berkredit mengikut skema pemarkahan yang telah ditetapkan oleh universiti.
- 2. Fasilitator/jurulatih bertanggungjawab memasukkan markah pelajar berdasarkan agihan penilaian kursus dengan mengisi Borang Penilaian Kursus Keseluruhan.
- 3. Pelajar yang gagal di dalam kursus ini, hendaklah mengambil semula kursus dengan cara mengulangi kursus tersebut sehingga lulus.

# PEMANTAUAN

Pemantauan kursus akan dilaksanakan dalam dua bentuk iaitu pemantauan **pentadbiran** dan **proses pembelajaran** oleh Bahagian Hal Ehwal Pelajar dan Alumni.



	SENARAI KURSUS KO-KURIKULUM BERKREDIT UNIT KOKURIKULUM BAHAGIAN HAL EHWAL PELAJAR DAN ALUMNI					
NO	CODE	SETARA CODE	COURSE	CREDIT		
		КО	MPONEN PENGUCAPAN AWAM			
1.	QKP1002	QKP 3112	PUBLIC SPEAKING	2		
2.	QKP1102	QKP 3122	EMCEEING	2		
3.	QKP1202	QKP 3132	JOURNALISM	2		
			KOMPONEN KEBUDAYAAN			
1.	QKB1002	QKB 3112	GAMELAN	2		
2.	QKB1402	QKB 3122	TRADITIONAL DANCE	2		
3.	QKB1502	QKB 3132	THEATRE	2		
	KOMPONEN KESUKARELAWANAN					
1.	QKL 1002	QKL 3112	VOLUNTEERISM	2		
2.	PLS 1011	PLS 3111	RESERVE OFFICERS TRAINING UNIT (ROTU) 1	1		
3.	PLS 1021	PLS 3121	RESERVE OFFICERS TRAINING UNIT (ROTU) 2	1		
4.	PLS 2011	PLS 3131	RESERVE OFFICERS TRAINING UNIT (ROTU) 3	1		
5.	PLS 2021	PLS 3141	RESERVE OFFICERS TRAINING UNIT (ROTU) 4	1		
6.	PLS 3011	PLS 3151	RESERVE OFFICERS TRAINING UNIT (ROTU) 5	1		
7.	PLS 3021	PLS 3161	RESERVE OFFICERS TRAINING UNIT (ROTU) 6	1		
	J	к	OMPONEN KEUSAHAWANAN			
1.	QKE1102	QKE 3112	ENTREPRENEURSHIP	2		
	KOMPONEN DAYA USAHA DAN INOVASI					
1.	QKI 1002	QKI 3112	PHOTOGRAPHY	2		
2.	QKI 1202	QKI 3122	BATIK CANTING	2		
	KOMPONEN KHIDMAT KOMUNITI					
1.	QKK1002	QKK 3112	BAKTISISWA	2		

# SINOPSIS KURSUS KO-KURIKULUM BERKREDIT

#### KOMPONEN PENGUCAPAN AWAM

COURSE CODE	:	QKP 3112
COURSE NAME	:	PUBLIC SPEAKING
		PENGUCAPAN AWAM

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course will cover basic public speaking knowledge and skills which include: planning, implementation, evaluation and managing public speaking competition, presentation techniques, persuasive speech, audience analysis and the importance of public speaking techniques.

#### **Course Outcomes**

At the end of the course students are able to:

- 1. Generate ideas clearly, effectively, confidently orally and in writing.
- 2. Analyse ideas and find alternative solutions.
- 3. Organise relevant information from a variety of sources.
- 4. Practise moral and ethical values in research process.

- 1. Grice, G. L., & Skinners J. F. (2004). Mastering Public Speaking (5<sup>th</sup> ed.). Boston: Allyn & Bacon.
- 2. Lucas, S. E. (2004). The Art of Public Speaking (8<sup>th</sup> ed.). New York: McGraw Hill.
- 3. Jeary, T. (2004). Life is a Series of Presentations. New York: Fireside

#### COURSE CODE : QKP 3122 COURSE NAME : EMCEEING PENGACARAAN MAJLIS

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course will expose students to how to host functions, techniques of script writing, pronunciation training, presentation techniques, persuasive speech, audience analysis and the importance of public speaking techniques.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Generate ideas clearly, effectively, confidently orally and in writing.
- 2. Analyse ideas and find alternative solutions.
- 3. Organise relevant information from a variety of sources.
- 4. Practise moral and ethical values in the research process.

- 1. N. A. Salleh. (1976). Aneka Contoh Teks Pengacaraan Majlis. Selangor: Al Falah.
- 2. N. A. Salleh. (1976). Aneka Contoh Pantun Pilihan Mengikut Atur Cara Majlis. Selangor: Al Falah.

#### COURSE CODE : QKP 3132 COURSE NAME : JOURNALISM ASAS KEWARTAWANAN

2 Credit Hours Pre-requisite : None

#### Course Synopsis

This course will expose the students to the field of journalism, various types of writing, editing, interviewing techniques, presentation of news and challenges as a journalist.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Generate ideas clearly, effectively, confidently orally and in writing.
- 2. Analyse ideas and find alternative solutions.
- 3. Organise relevant information from a variety of sources.
- 4. Practise moral and ethical values in the research process.

- 1. Mohd Jais, Zainal. (2005). Asas kewartawanan dan penulisan. Bengkel kewartawanan foto dan membina grafik news letter.
- 2. Faridah Ibrahim, & Mus Chairil Samani. (2000). Etika Kewartawanan (edisi 2). Subang Jaya: F.A.R Publishers.

#### KOMPONEN KEBUDAYAAN

COURSE CODE	:	QKB 3112
COURSE NAME	:	GAMELAN
		GAMELAN

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course will expose to the students the development and role of Gamelan music. It includes the identification and disclosure of basic techniques on how to play Gamelan musical instruments and songs.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Describe the historical development of Gamelan music.
- 2. Recognise and understand the basic functions of the Gamelan instruments.
- 3. Demonstrate and apply principles in performing and organising stage performances.

- 1. Mohd Azam Hj. Sulong, & Mastor Hj. Jarkaseh. (2009). Asas Pendidikan Muzik II. Perpustakaan Negara Malaysia: Tabuh Emas.
- 2. Dwiono Hermantoro. (2010). Notasi Lagu Muzik Gamelan. Skudai: Universiti Teknologi Malaysia.
- 3. Wasisto Suryodiningrat. (1971). Gamelan, Dance dan Wayang. Yogyakarta: Gadja Mada University Press.

# COURSE CODE : QKB 3122 COURSE NAME : TRADITIONAL DANCE SENI TARI

2 Credit Hours Pre-requisite : None

# Course Synopsis

This course covers the movements and techniques of the different dances of various races in Malaysia, performing dances including during dance workshops conducted for local communities, organizing intellectual discourse series and conducting research, as well as learning the techniques to master the dances at a professional level.

# **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Deliver the ideas clearly, effectively and confidently orally.
- 2. Demonstrate the values of soft skills learned.
- 3. *Master the basic techniques in traditional dance moves.*

- 1. Asmad. (1990). Kesenian Tarian Melaka. Associated Distributors (M) Sdn. Bhd.
- 2. Harun Mat Piah, & Siti Zainon Ismail. (1986). Lambang Sari: Tuan Gamelan Terengganu. Kuala Lumpur: PSKNT dan UKM.
- 3. Kamien, R. (2002). Music: An Appreciation (8<sup>th</sup> ed.). New York: McGraw-Hill.
- 4. Kementerian Kebudayaan Belia dan Sukan. (1981). Tarian-tarian Malaysia. Kuala Lumpur.
- 5. Lee, I. (2000). Ethnic Musical Instruments of Malaysia. Kuala Lumpur: Win Publication.

COURSE CODE	:	QKB 3132
COURSE NAME	:	THEATRE
		TEATER

2 Credit Hours Pre-requisite : None

# Course Synopsis

This course will expose the students to the basics of acting such as emotions of a character, throwing vocals and basic cinematography such as stage design, props, theatre discipline, fashion and audio controlling.

# **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Deliver the ideas clearly, effectively and confidently orally.
- 2. Demonstrate the values of soft skills learned.
- 3. *Master the basic techniques in acting and stage control.*

- 1. Akademi Seni Budaya dan Warisan Kebangsaan. (2013). Program Latihan Modal Insan Seni & Budaya. Kementerian Penerangan, Komunikasi dan Kebudayaan.
- 2. Clausen, M. (2000). Centre Stage. Australia: Heineman Ltd.
- 3. Davies, G. (1983). Practical Primary Drama. Heineman Educational.

#### KOMPONEN KESUKARELAWANAN

COURSE CODE	:	QKL 3112
COURSE NAME	:	VOLUNTEERISM
		ASAS KESUKARELAWANAN

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course covers the concept, theory and practice of voluntary work, its importance in handling disasters, planning, monitoring, managing and evaluating disaster management programmes and voluntary activities.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Demostrate the skills to be a volunteer.
- 2. Deliver the ideas clearly, effectively and confidently orally.
- 3. Appreciate the value of soft skills learned.

- 1. Azizan Bahari. (2007). Becoming A Volunteer. Kuala Lumpur: International Youth Centre.
- 2. Azizan Bahari. (2008). Menjadi Pemimpin. Petaling Jaya: Qarya.
- 3. Hybels, B. (2004). The Volunteer Revolutionary Unleashing the Power of Everbody. Canada: Harper Collins.
- 4. Josie, M. F., & Abdul Ibrahim. (2002). A Giving Society? The State of Philanthropy in Malaysia. Penang: USM Publishers.
- 5. Marcovitz, H. (2004). Teens and Volunteerism. New York: Mason Crest Publisher.



COURSE CODE	:	PLS 3111
		PLS 3121
		PLS 3131
		PLS 3141
		PLS 3151
		PLS 3161
COURSE NAME	:	RESERVE OFFICERS TRAINING UNIT (ROTU)
		PALAPES

1 Credit Hour per Semester Pre-requisite : None

# **Course Synopsis**

Refer to PALAPES Course subjects

# **Course Learning Outcomes**

At the end of the course students are able to:

Refer to PALAPES Course subjects

#### References

Refer to PALAPES Course subjects

#### **KOMPONEN KEUSAHAWANAN**

COURSE CODE	:	QKE 3112
COURSE NAME	:	ENTREPRENEURSHIP
		LATIHAN KEUSAHAWANAN

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

The course covers the entrepreneurial aspects in identifying problems in a community and, collects and analyses data for the purpose of identifying project components which can be improved and upgraded to national and international standards.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Identify and conduct simple research for business practices in institutions.
- 2. Demonstrate entrepreneurship skills.
- 3. Appreciate the values of soft skills that have been learned.
- 4. Practise professional moral ethics in the preparation and implementation of business plans.

- 1. Hisrich, R. D. (1997). Entrepreneurship. Case Western Reserve University.
- 2. Zimmerer, T. W. (2000). Essentials of Entrepreneurship and Small Business Management. University of Minnesota.
- 3. Dollinger, M. J. (1998). Entrepreneurship Strategies & Resources. Prentice Hall.
- 4. Martin, Michael J. C. (1994). Managing Innovation and Entrepreneurship in Techno. John Wiley & Sons.
- 5. Berman. (2001). Small Business Entrepreneurship.Prentice Hall.

#### KOMPONEN DAYA USAHA DAN INOVASI

COURSE CODE	:	QKI 3112
COURSE NAME	:	PHOTOGRAPHY
		FOTOGRAFI

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

The purpose of this course is to enhance the students' knowledge on the concepts of photography. This course will expose students to the brief history of photography, basic camera control and handling techniques, lighting techniques, shooting techniques and photo editing techniques.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Communicate ideas clearly, effectively and confidently orally.
- 2. Practise ethical behaviours, as well as having a sense of responsibility towards society.
- 3. Master and demonstrate technical and artistic knowledge in photograpgy.

#### References

1. Redzuan Ahmad. Komposisi dan Cahaya Termasuk Fotografi Digital. Redzuan Fotomedia.

# COURSE CODE : QKI 3122 COURSE NAME : BATIK CANTING CANTING BATIK

2 Credit Hours Pre-requisite : None

# Course Synopsis

The purpose of this course is to enhance the students' knowledge on the concepts of batik canting. This course covers the history and the development of batik and its contributions to the Malaysian socio-cultural make-up. Students will also be taught the methods and techniques of batik canting.

# Course Learning Outcomes

At the end of the course students are able to:

- 1. Deliver ideas clearly, effectively and confidently orally.
- 2. Demonstrate ethical behaviours in addition to having a sense of responsibility towards society.
- 3. Demonstrate skills and talents of batik canting.

- 1. Kathleen Chee. (2004). Pendidikan Seni Visual. Kuala Lumpur: Penerbitan Pelangi Sdn. Bhd.
- 2. Noel Dyrenforth. (1975). Batik. London. Orbis Publishing Limited.
- 3. Perbadanan Kraftangan Malaysia. (1997). Kit Pendidikan Batik. Kuala Lumpur: Perbadanan Kraftangan Malaysia.
- 4. Tim Bina Karya Guru. (2007). Seni Budaya dan Keterampilan Untuk Sekolah Dasar Kelas VI. Erlangga.

#### KOMPONEN KHIDMAT KOMUNITI

COURSE CODE	:	QKK 3112
COURSE NAME	:	BAKTISISWA

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

The purpose of this course is to enhance the students' knowledge on the concepts of baktisiswa. This course covers the activities of baktisiswa that will contribute to the Malaysian community which include community planning and, handling and implementation of the baktisiswa activities.

#### **Course Learning Outcomes**

At the end of the course students are able to:

- 1. Deliver the ideas clearly, effectively and confidently orally.
- 2. Demonstrate ethical behaviours in addition to having a sense of responsibility towards society.
- 3. Practise professional moral ethics in the preparation and implementation of the baktisiswa activities.
- 4. Appreciate the values of soft skills that have been learned.

- 1. Dani Salleh. (2004). *Pembangunan Komuniti: Dasar, Konsep, Strategi dan Isu di Malaysia*. Sintok: Penerbit UUM
- 2. Rahmat Ismail. (1997). *Etika Sosial. Satu Peradaban Dalam Kehidupan Sosial Manusia*. Kuala Lumpur: Utusan Publications



# FACULTY CORE COURSES

# FACULTY CORE COURSES

It is compulsory for 20 credit hours of core faculty courses are to be taken by the Bachelor of Engineering programme students as follows:

CODE	COURSE	CREDIT
EFA 3253	Engineering Mathematics I (Calculus III)	3
EFA 3213	Engineering Mathematics II (Differential Equation)	3
EFA 3223	Engineering Mathematics IV (Statistics)	3
EFC 3223	Computing I (C and C++)	3
EFC 3213	Computing II (Numerical Methods and Engineering Softwares)	3
EFB 3212	Introduction to Engineering	2

The core faculty courses are compulsory for all Bachelor of Mechanical Engineering (ZK 08), Bachelor of Electrical and Electronics Engineering with Honors (ZK 23) students.

CODE	COURSE	CREDIT
EFA 3233	Engineering Mathematics IIIA (Complex Variable and Vector)	3

This course is only compulsory for all Bachelor of Civil Engineering (ZK 01) students.

CODE	COURSE	CREDIT
EFA 3243	Engineering Mathematics IIIB (Operations Research and Computer Information Systems)	3

# SYNOPSIS OF FACULTY CORE COURSES

COURSE CODE : EFA 3253 COURSE NAME : ENGINEERING MATHEMATICS I (CALCULUS III) MATEMATIK KEJURUTERAAN I (KALKULUS III)

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course is designed to extend the ideas of single-variable calculus (example: functions, differentiation, integration and vector functions) to functions of several variables. Topics include multi-variable functions, partial derivatives, local extrema, absolute extrema, Lagrange multipliers, double integrals, triple integrals, vector functions, scalar fields, vector fields, line integrals, Green's theorem, surface integrals, Stoke's theorem and Gauss's theorem. This concept is extremely important in sciences and engineering application.

#### **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Understand the characteristics of multivariable functions.
- 2. Apply standard procedures to determine the partial derivatives to find extremum values.
- 3. Apply appropriate procedures to determine integral in Cartesian, polar, cylindrical and spherical coordinates by using multiple integrals.
- 4. Solve various problems in scalar and vector fields by using appropriate theorems.

- 1. Howard Anton, Irl Bivens, & Stephen Davis. (2005). *Calculus, Eight Edition.* John Wiley & Sons.
- 2. Maslan Osman, & Yusof Yaacob. (2008). *Multivariable and Vector Calculus*. Penerbit UTM Press.
- 3. Weir, Hass, Giordano. (2005). *Thomas' Calculus, Eleventh Edition.* Pearson (Addison Wesley).



# COURSE CODE: EFA 3213COURSE NAME: ENGINEERING MATHEMATICS II (DIFFERENTIAL EQUATION)MATEMATIK KEJURUTERAAN II (PERSAMAAN PEMBEZAAN)

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This course will discuss about concept of first order ordinary linear differential equation and second order ordinary linear differential equation. The students also learn Laplace Transforms and Fourier Series. Applications in engineering are also included in this course.

#### Course outcomes

Upon completion of this course, students are able to:

- 1. Explain the basic concepts of differential equations (type & methods).
- 2. Apply correct analytical methods to solve first and second order differential equations using appropriate techniques.
- 3. Use the method of separation of variables and Fourier Series to solve partial differential equations.

- 1. Abdul Wahid, Mohd Nor. (2008). Differential Equations for Engineering Students. Universiti Teknologi Malaysia.
- 2. Dennis G. Zill. (2004). Differential Equations with Modeling Application. Brooks Cole.
- 3. Normah Maan et al. (2008). Differential Equations Module. Universiti Teknologi Malaysia.



#### COURSE CODE : EFA 3233 COURSE NAME : ENGINEERING MATHEMATICS IIIA (COMPLEX VARIABLE AND VECTOR) MATEMATIK KEJURUTERAAN IIIA (PEMBOLEHUBAH KOMPLEKS)

3 Credit Hours Pre-requisite : None

# Course Synopsis

This course is an extension of Calculus I, II and III (Real Variables), and therefore has about the same theoretical development as in Calculus of single- and multiple-Real Variables. The main topics are functions of a single complex variable, complex differentiation, complex integration and complex series.

# Course outcomes

Upon completion of this course, students are able to:

- 1. Apply the theoretical foundations of complex variables to perform complex differentiation and integration.(C3)
- 2. Solve the analytic, elementary functions and complex series using complex variable.(C3)
- 3. Apply the principles of complex variable to model engineering problems.(C3)

- 1. Ali Hassan Mohamed Murid. (2009). Complex Variables for Mathematics, Science and Engineering, Universiti Teknologi Malaysia.
- 2. James Ward Brown, & Ruel V. Churchill. (2009). Complex Variables and Application. Eighth Edition., New York: Mc Graw Hill.
- 3. Steven G.Krantz. (2008). Complex Variables: A Physical Approach with Applications and MATLAB. Chapman & Hall/CRC.
- 4. Spiegel, Murray R. (1984). Schaum's Outlines, Complex Variables, McGraw Hill.



#### COURSE CODE : EFA 3243 COURSE NAME : ENGINEERING MATHEMATICS IIIB (OPERATIONS RESEARCH AND COMPUTER INFORMATION SYSTEMS) MATEMATIK KEJURUTERAAN IIIB (PENYELIDIKAN OPERASI DAN SISTEM MAKLUMAT KOMPUTER)

3 Credit Hours Pre-requisite: None

# **Course Synopsis**

This course is designed to expose students with scientific methods and operations research. Examples of applications in operations research and application models in decision making are introduced. Topics include linear programming, project management, transportation and assignment problems, network model, analytic hierarchy process, waiting lines and queuing theory model, and simulation modelling. Students will also learn how to use Microsoft Excel to analyse and solve problems. Students will be exposed to data analysis and problem solving using Microsoft Excel.

# Course outcomes

Upon successful completion of this course, students are able to:

- 1. Construct, formulate and solve linear programming problems.
- 2. Plan, monitor, and control projects with the use of PERT and CPM.
- 3. Analyse the mathematical models using fundamental methods in optimization.

- 1. Render, B., Stair, Jr. R.M., Hanna, M.E., Hale, T.S, 2018. Quantitative Analysis for Management, 13th Edition, Pearson.
- 2. Taha, H.A., 2017. Operations Research: An Introduction. 10th Ed, Pearson Prentice Hall.
- 3. Gupta, P.K., Hira, D.S., 2007. Operations Research. Revised Ed. Chand (S.) & Company Ltd.
- 4. Winston, W.L., 2003. Operations Research: Applications and Algorithms. 4th Ed. Cengage Learning.



#### COURSE CODE : EFA 3223 COURSE NAME : ENGINEERING MATHEMATICS IV (STATISTICS) MATEMATIK KEJURUTERAAN IV (STATISTIK KEJURUTERAAN)

3 Credit Hours Pre-requisite: None

# Course Synopsis

This is a compulsory course that will expose students to the application of statistics in engineering. It covers topics of fundamentals of statistics, elements of probability theory, discrete and continuous random variables, mathematical expectations, sampling theory, hypothesis testing, regression and correlation and one-way analysis of variance. Students will be exposed to data analysis using software such as Microsoft Excel, SPSS or Minitab.

#### Course outcomes

Upon completion of this course, students are able to:

- 1. Identify appropriate techniques to solve engineering problems involving the concepts of statistics, probability, various hypothesis techniques, ANOVA and linear regression.
- 2. Solve engineering problems involving the concepts of statistics, probability, various hypothesis techniques, ANOVA and linear regression
- 3. Demonstrate ability to use software to solve various statistical problems in engineering

- 1. Walpole, R.E., Myers, R.H., Myers, S.L., Ye, K., 2016. Probability & Statistics for Engineers & Scientists. 9<sup>th</sup> Ed. Pearson.
- 2. Montgomery, D.C., Runger, G.C., 2013. Applied Statistics and Probability for Engineers. 6<sup>th</sup> Ed. Wiley.
- 3. Devore, J.L., Farnum, N.R., Doi, J.A., 2013. Applied Statistics for Engineers and Scientists. 3<sup>rd</sup> Ed. Duxbury Press.
- 4. Montgomery, D.C., Runger, G.C. & Hubele, N.F., 2011. Engineering Statistics. 5<sup>th</sup> Ed. New York: John Wiley & Sons Ltd.
- 5. Navidi, W.C., 2008. Statistics for Engineers and Scientists. 2nd Ed. Mc-Graw Hill Higher Education.



#### COURSE CODE : EFC 3223 COURSE NAME : COMPUTING I (C AND C++) EFC 1103 PENGATURCARAAN KOMPUTER I (C DAN C++)

3 Credit Hours Pre-requisite : None

# Course Synopsis

This course exposes engineering students to the basics of computer programming sufficient for their subsequent core engineering courses. However, some design and problem solving skills using programming techniques will also be given. Emphasis will be put on techniques to calculate, compute, print, data keeping and manipulating suitable for engineering data, and compatible with other engineering software. Besides that, this course will also be focusing on the application aspect of computing library or framework to facilitate code writing.

#### **Course outcomes**

By the end of the subject, students are able to:

- 1. Analyze coding and engineering problem with regards to computer programming.
- 2. Design a coding solution using appropriate library to engineering problems.
- 3. Knowledge and hands-on skill on a programming IDE

- 1. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd Edition, Prentice Hall, 1988
- 2. P.J. Deitel, H.M. Deitel, Visual C++ How to Program, Deitel & Associates, 2008
- 3. Liang Y.D., Introduction to Programming With C++, Pearson International Edition, 2007



#### COURSE CODE : EFC 3213 COURSE NAME : COMPUTING II (NUMERICAL METHODS AND ENGINEERING SOFTWARES) PENGKOMPUTERAN II (KAEDAH BERANGKA)

3 Credit Hours Pre-requisite : None

# Course Synopsis

This course introduces general-purpose numerical methods concepts for solving problems in engineering. Students should develop an understanding of the strengths and limitations of standard numerical techniques applied to problems in engineering, such roots of nonlinear equations, systems of linear equations, regression and interpolation, numerical differentiation and integration and ordinary differential equation. MATLAB commands will be introduced to solve numerical problems.

# Course outcomes

Upon completion of this course, students are able to:

- 1. Relate their knowledge on the theoretical foundations of the most common numerical methods with engineering environment.
- 2. Apply the theoretical foundations of the knowledge to model pertaining to related engineering problems.
- 3. Analyse the mathematical models in engineering using various methods and tools in order to interpret the results from the analysis.

- 1. Rao,S.S. (2002). Applied Numerical Methods for Engineers and Scientists. Prentice-Hall.
- 2. Richard L. Burden, & John Douglass Faires. (2005). Numerical Analysis, 8<sup>th</sup> Edition. Thomson Brooks/Cole.
- 3. Steven C. Chapra. (2008). Applied Numerical Methods with MATLAB for Engineers and Scientists, 2<sup>nd</sup> Edition. McGraw-Hill.
- Steven C. Chapra, & Raymond P. Canale. (2006). Numerical Methods for Engineers, 5<sup>nd</sup> Edition, McGraw-Hill.



#### COURSE CODE : EFB 3212 COURSE NAME : INTRODUCTION TO ENGINEERING PENGENALAN KEPADA KEJURUTERAAN

2 Credit Hours Pre-requisite : None

# Course Synopsis

This subject introduces the overview of engineering world in its profession and education, while preparing students for initial process of design in engineering and brief concept of solutions. Aligning the students for representation of technical information, engineering measurements as well as the importance of dimensions, units and conversion. Some brief introductory to statics, strength of materials, energy and electrical that would be beneficial in ensuring students to appreciate the vast and crucial courses in coming years of studies. Exposure to basic design process as a team with various engineering disciplines and some knowledge of simple mobile phone and/or computer applications (using any related and suitable platform) would finally shape the students according to current trend or demands

#### **Course outcomes**

Upon completion of this course, students are able to:

- 1. Comprehend related knowledge in intro to engineering.
- 2. Formulate or identify suitable solution to engineering issue.
- 3. Analyse the techniques used for basic engineering design.
- 4. Communicate effectively to express project, assignments and/or report according to engineering knowledge.
- 5. Function effectively as individuals and as team member in conducting project and/or experimental work.

- 1. Arvid R.Eide et all, Engineering Fundamentals and Problem Solving, 7th Edition, McGraw-Hill, 2018.
- 2. George E.Dieter & Linda C.Schmidt, Engineering Design, 5th Edition, McGraw-Hill, 2013.
- 3. Ralph M.Ford & Chris S.Coulston, Design for Electrical and Computer Engineers, McGraw-Hill, 2008.



# CIVIL ENGINEERING DEPARTMENT

# **CIVIL ENGINEERING DEPARTMENT**

#### Professor

Brig Jen Prof. Ir. Dr. Norazman bin Mohamad Nor (Bersara) PAT JMN BCN KAT ACM PJM PPS Peng BSc Civil (Texas) FIEM AAE, MSc (USM) , Ph.D. (Cranfield)

#### **Associate Professor**

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Kapt Gs. Ir. Dr. Neza bin Ismail (Bersara) PM-IGRSM, P.Eng (PEPC) Dip. Civil (UTM), B.Eng. (Civil)(UTM), M.Sc. Construction Management (UTM), Ph.D. (UTM)

Mohd Asri bin Md Nor B.Sc. (Hons.)(Civil)(Pacific), M.Sc.(UC Davis)

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Lt Kol Dr. Vikneswaran A/L Munikanan (Bersara) B.Eng. (Hons)(Civil)(UTM), M.Eng. (UTM), EngD.(UTM)

Dr. Ng Choy Peng Dip. Traffic Safety (Aalborg University), B.Eng.(Hons.)(Civil)(UPM), M.Sc. (UPM), Ph.D. (UPM)

Ts. Muhamad Azani bin Yahya B.Eng. (Hons.)(Civil)(UTM), M.Sc. (USM)

Dr. Nordila binti Ahmad B.Eng. (Hons.)(Civil)(UTM), M.Eng.(UTM), Ph.D. (UPM)

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Dr. Jestin binti Jelani B.Eng. (Hons.)(Civil)(UTHM), M.Eng. (UTHM), Ph.D. (UPNM)

Dr. Mohd Nazrin bin Mohd Daud B.Eng. (Hons.)(Civil)(KUITTHO), M.Eng. (UTHM), Ph.D. (UPM)

# Lecturer

Zulkifli bin Abu Hassan Dip. Civil (UiTM), B.Eng. (Hons.)(Civil) (UiTM), M.Sc. (UiTM)

Noor Aina Binti Misnon B.Eng. (Hons.)(Civil)(UTM), M.Sc. (UPM)

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Suriyadi bin Sojipto B.Eng. (Hons)(Civil)(UTM), M.Eng. (UKM)

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Ts. Faridah Hanim binti Khairuddin B.Eng. (Civil)(UTM), M.Sc. (UPM)

Sr. Gs. Wan Mohamed Syafuan bin Wan Mohamed Sabri M-RISM, PM-IGRSM Dip. Land Survey (POLISAS), BSc. Geomatics Science & Surveying (Hons.)(UiTM), MSc. Geographic Information Science (UiTM)

# COURSE STRUCTURE AND TOTAL CREDIT REQUIREMENT FOR THE PROGRAM BACHELOR OF CIVIL ENGINEERING (ZK01)

Total credit required to fulfill for graduation are listed in table below. The duration of study to be completed are 8 semesters. Courses need to be taken are described in the section as below.

COURSES	CREDIT		
University Course: i. University Core ii. University Elective	24 6		
Program Core Course: i. Program ii. Faculty	81 20		
Program Elective Course (Technical Specialization)	9		
TOTAL CREDIT FOR GRADUATION	140		

# PROGRAM CORE COURSE BACHELOR OF CIVIL ENGINEERING PROGRAM (ZK01)

#### LIST OF PROGRAM CORE COURSE (90 CREDITS):

CODE	COURSE		PRE-REQUISITE		
CODE	COURSE	GREDIT	CODE	STATUS	
ECC 3313	Applied Mechanics	3	-		
ECC 3323	Construction Materials and Technology	3	-		
ECC 3333	Mechanics of Materials	3	ECC3313	MP	
ECC 3343	Fluid Mechanics	3	-		
ECC 3402	Engineering Geology	2	-		
ECC 3413	Mechanics of Structures	3	ECC3333	MP	
ECC 3423	Engineering Hydrology	3	-		
ECC 3432	Graphics and Engineering Drawings	2	-		
ECC 3443	Structural Analysis	3	ECC3413	MT	
ECC 3453	Water Supply and Sewerage	3	-		
ECC 3463	Soil Mechanics	3	-		
ECC 3473	Geomatics	3	-		
ECC 3503	Reinforced Concrete Design I	3	ECC3413	MP	
ECC 3513	Geotechnics	3	ECC3463	MT	
ECC 3523	Highway Engineering	3	-		
ECC 3532	Civil Engineering Project Management	2	-		
ECC 3543	Reinforced Concrete Design II	3	ECC3503	MT	
ECC 3553	Hydraulics	3	ECC3343	MT	
ECC 3563	Foundation Engineering	3	ECC3513	MT	
ECC 3573	Transportation Engineering	3	-		
ECC 3584	Industrial Training	4	-		
ECC 3603	Steel and Timber Structures Design	3	ECC3413	MT	

ECC 3613	Environmental Engineering	3	-	
ECC 3622	Infrastructure Design Project (Capstone I)	2	-	
ECC 3632	Final Year Project I	2	-	
ECC 3642	Engineers in Society	2	-	
ECC 3652	Engineering Contract, Estimation and Economics	2	-	
ECC 3662	Structural Design Project (Capstone II)	2	ECC3543 / ECC3603	МТ
ECC 3674	Final Year Project II	4	ECC3632	MP

Note: MP – Must Pass; MT – Must Taken

# PROGRAM ELECTIVE COURSE (TECHNICAL SPECIALIZATION) BACHELOR OF CIVIL ENGINEERING PROGRAM (ZK01)

# LIST OF PROGRAM ELECTIVE COURSE (TECHNICAL SPECIALIZATION) COURSE (9 CREDITS):

CODE	COURSE	CREDIT	PRE- REQUISITE
ECC 3713	Nuclear, Biological and Chemical Contamination	3	-
ECC 3723	Ground Improvement	3	-
ECC 3733	Advanced Highway Engineering	3	-
ECC 3743	Advanced Construction Materials and Technology for Military Application	3	-
ECC 3753	Structure Subject to Blast	3	-
ECC 3763	Integrated Water Resources Management	3	-
ECC 3773	Environmental Hydraulics and Hydrology	3	-
ECC 3783	Introduction to Railways and Tunnels	3	-
ECC 3793	Damage Assessment, Repair and Maintenance of Concrete Structures	3	-
ECC 3803	Introduction to Bridge Engineering	3	-
ECC 3813	Hydrologic Analysis and Design	3	-

# CURRICULUM STRUCTURE BACHELOR OF CIVIL ENGINEERING PROGRAM (ZK01)

FIRST YEAR							
SEMESTER 1				SEMESTER 2			
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
		UNI	VERSITY CO	RE COURSE	Ē		
DUS 3012	Military History	2	-	MPU 3132	Appreciation of Ethics and Civilisations	2	-
MPU 3142	Philosophy and Current Issues	2	-				
LLE 3012	English for Academic Writing	2	-	DUM 3022	Military Leadership	2	-
	· · · · · · · · · · · · · · · · · · ·	UNIVE	RSITY ELEC	TIVE COUR	SE		
QK 3XX2/ PLS 3111	Co-curiculum / PALAPES**	2/1**		QK 3XX2/ ALK3112/ PLS3121	Co-curiculum / General Military Training*/ PALAPES**	2/2*/1**	-
		FA	CULTY COR	E COURSE			
EFA 3253	Engineering Mathematics I (Calculus III)	3	-	EFA 3213	Engineering Mathematics II (Differential Equation)	3	-
				EFC 3223	Computing I (C and C++)	3	-
PROGRAM CORE COURSE							
ECC 3313	Applied Mechanics	3	-	ECC 3333	Mechanics of Materials	3	+ECC 3313
Lama ECC 3323	Construction Materials and Technology	3	-	ECC 3343	Fluid Mechanics	3	-
EFB 3212	Introduction to Engineering (IR 4.0)	2	-				
TOTAL		19/17*/ 18**		TOTAL		18/18*/ 17**	

Civillian Student

\* Cadet Officer

\*\* PALAPES

+ Must Pass

# Must Taken
SECOND YEAR							
SEMESTER 3			SEMESTER 4				
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
		U		CORE COUR	SE		
LLF3XX1	Foreign Language I	1	-	LLF3XX1	Foreign Language II	1	-
LLA3XX1	Foreign Language I	Audit	-	LLA 3XX1	Foreign Language II	Audit	-
MPU3412 or MPU 3422	Human Movement Science or Community Service	2	-				
DUS 3022	Introduction to Strategic Studies	2	-	MPU3312 or MPU 3332	Nationhood in World Politics or Fiqh Keutamaan	2	-
DUS 3032	Military Law and Laws of Armed Conflict	2	-	LLE 3032	Al – Ghazali Dialogue : English Communicatio n	2	-
		UNI	/ERSITY EL	ECTIVE COL	JRSE		
QK 3XX2/ ALK3122/ PLS3131	Co-curiculum / General Military Training*/ PALAPES**	2/2*/1**	-	QKS 3172/ PLS 3141	Unarmed Combat* / PALAPES**	2*/1**	
		Р	ROGRAM C	ORE COURS	SE .	·	
ECC 3402	Engineering Geology	2	-	ECC 3443	Structural Analysis	3	# ECC 3413
ECC 3413	Mechanics of Structures	3	⁺ECC 3333	ECC 3453	Water Supply and Sewerage	3	-
ECC 3423	Engineering Hydrology	3	-	ECC 3463	Soil Mechanics	3	-
~ ECC 3432	Graphics and Engineering Drawings	2	-	~ ECC 3473	Geomatics	3	-
TOTAL		19/19*/ 18**		TOTAL		17/19*/16**	

Civillian Student

\* Cadet Officer

\*\* PALAPES

~ Offered in both semester

- + Must Pass
- # Must Taken

THIRD YEAR							
SEMESTER 5			SEMESTER 6				
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
		U	NIVERSITY	CORE COU	RSE		
MPU 3212	Basic Entrepreneurship	2	-				
	1	UN	VERSITY EL	ECTIVE CO	URSE		
PLS 3151	PALAPES**	1**	-	PLS 3161	PALAPES**	1**	-
			FACULTY C	ORE COURS	SE		
EFA 3223	Engineering Mathematics IV (Statistics)	3	-	EFA 3243	Engineering Mathematics IIIB (Operations Research and Computer Information Systems)	3	-
	1	]	PROGRAM	ORE COUR	SE	J	ł
ECC 3503	Reinforced Concrete Design I	3	+ ECC 3413	ECC 3543	Reinforced Concrete Design II	3	# ECC 3503
ECC 3513	Geotechnics	3	# ECC 3463	ECC 3532	Civil Engineering Project Management	2	-
ECC 3523	Highway Engineering	3	-	ECC 3563	Foundation Engineering	3	# ECC 3513
ECC 3553	Hydraulics	3	# ECC 3343	ECC 3573	Transportation Engineering	3	-
				ECC 3XX3	Technical Specialization I	3	-
TOTAL		17/18*/18**		TOTAL		17/18*/18**	

Civillian Student

\* Cadet Officer

\*\* PALAPES

+ Must Pass

# Must Taken

THIRD YEAR					
INTER – SESSION					
CODE	COURSE	CREDIT	PRE- REQUISITE		
ECC 3584	Industrial Training	4	Passed 60 credit hours		
TOTAL		4			

	FOURTH YEAR						
SEMESTER 7			SEMESTER 8				
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
	T		FACULTY C	ORE COU	IRSE		
EFC 3213	Computing II (Numerical Methods and Engineering Softwares)	3	-				
	-		PROGRAM C	CORE COL	JRSE		
ECC 3603	Steel and Timber Structures Design	3	# ECC 3413	ECC 3642	Engineers in Society	2	-
ECC 3613	Environmental Engineering	3	-	ECC 3652	Engineering Contract, Estimation and Economics	2	-
ECC 3622	Infrastructure Design Project (Capstone I)	2	-	ECC 3662	Structural Design Project (Capstone II)	2	# ECC 3543 or # ECC 3603
ECC 3632	Final Year Project I	2	Passed 80 credit hours	ECC 3674	Final Year Project II	4	+ ECC 3632
PROGRAM ELECTIVE COURSE							
ECC 3XX3	Technical Specialization II	3	-	ECC 3XX3	Technical Specialization III	3	-
TOTAL		16/16*/16**		TOTAL		13/13*/13**	

**Civillian Student** 

\* Cadet Officer

\*\* PALAPES

+ Must Pass

# Must Taken

## SYNOPSIS OF CORE COURSE PROGRAM BACHELOR OF CIVIL ENGINEERING PROGRAM (ZK01)

COURSE CODE : ECC 3313 COURSE NAME : APPLIED MECHANICS MEKANIK GUNAAN

3 Credit Hours Pre-requisite : None

# **Course Synopsis**

This is a core subject for Civil Engineering students taken in the first year of their programme. It is a continuation of Physics course taken in Foundation Year. Generally, this course is divided into two parts; Static and Dynamic. Static deals with equilibrium of bodies at rest or moving with constant velocity. Students will expose to resolution of forces, equilibrium of a particle, and rigid bodies, centre of gravity and moment of inertia of an area. Meanwhile, in Dynamic, students will explore the accelerated motion of bodies including kinematics and kinetics of particles and rigid bodies. Kinematic of particles is including relationship between displacement, velocity and acceleration against time. On the other hand, Kinetic of particles will expose the concepts of force and acceleration, energy and work and impulse and momentum.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Define and formulate the state of equilibrium of a particle and a rigid body and use the equations of equilibrium to solve problems involving the equilibrium of a particle and of a rigid body applying the concepts of resultant and resolution of forces and the concept of moment of a force and moment of a couple.
- 2. Analyse effect of friction and to calculate the centre of gravity and centroid of a body, and the moment of inertia of an area.
- 3. State and describe the relationships between displacement, velocity and acceleration against time and able to use such relationships to solve problems involving motions of a particle. Able to apply Newton's second law of motion to establish relationship between force and acceleration, and can utilise principle of work and energy, and the principle of impulse and momentum to solve problems involving kinetics of particle.

- 1. Hibbeler, R. C. (2012). Engineering Mechanics Statics. 13<sup>th</sup> Ed. SI. Singapore: Prentice Hall.
- 2. Hibbeler, R.C. (2012). Engineering Mechanics: Dynamics. S.I. Edition. 13<sup>th</sup> Ed. Singapore: Prentice Hall.
- 3. Meriam J.L. & L. G. Kraige (2008). Engineering Mechanics, Vol 1: Statics, 6<sup>th</sup> Ed. Canada: John Wiley & Sons.
- 4. Meriam J.L. & L.G. Kraige. (2008). Engineering Mechanics: Dynamics. S.I. Edition. John Wiley & Sons.

#### COURSE CODE : ECC 3333 COURSE NAME : MECHANICS OF MATERIALS MEKANIK BAHAN

3 Credit Hours Pre-requisite : Must have passed Applied Mechanics (ECC 3313)

## Course Synopsis

This is core course of Civil Engineering programme. In this course, students will be introduced to the principle of stress and strain occurred when a various type of external and internal load applied within a rigid body extend to members or elements. Further, students will be exposed to the various method to determine the displacement and transformation of stress and strain. Finally students will be taught on critical load for buckling column.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Identify the appropriate formulae to calculate the stress in a uniformly loaded specimen for the following loading configurations: uniaxial tension and compression; torsional loading; direct shear; and bending under statically determine conditions.
- 2. Determine internal load distributions and draw bending moment diagrams and torque position diagrams for beams and shafts with step change in cross-section.
- 3. Determine displacement and strain in members with step changes in loading and/or radius given the loading and modulus or loading and stress-strain curve. Students will be able to calculate these displacements for uniaxial tension and compression; torsion.
- 4. Transform the state of stress at a point in a material to determine principal stresses; maximum shear stress and the orientation of the stress element.
- 5. Calculate the critical load for the buckling of a pin supported column and determine if the failure mode is compression or buckling.

- 1. Hibbeler, R. C. (2014). Mechanics of Materials. 9<sup>th</sup> Ed. SI. Singapore: Pearson Education South Asia Pte. Ltd.
- 2. Hibbeler, R. C. (2010). Engineering Mechanics Statics. 12<sup>th</sup> Ed. SI. Singapore: Prentice Hall.
- 3. Ferdinand P. Beer, E Russell Johnston Jr., & John T. De Wolf. (2002). Mechanics of Materials.3<sup>rd</sup> Edition: Mc Graw-Hill International Edition.
- 4. James M. Gere (2000). Mechanics of Materials. 5<sup>th</sup> Edition: Brooks/Cole Thomson Learning.

COURSE CODE	: ECC 3343
COURSE NAME	: FLUID MECHANICS
	MEKANIK BENDALIR

3 Credit Hours Pre-requisite : None

## Course Synopsis

This course will enable students to understand the fundamental of fluid mechanics in civil Engineering, including fluid static and kinematics. The course also focuses on momentum equation of fluid and its application. Other than that, student will be exposed to the analysis of pipe flow which consist of flow classification and losses in a pipeline system. At the end of this course, student will be able to analyse pipe network system including with the application of pump in the pipeline system.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Identify and describe some Fluid Mechanics theories.
- 2. Identify and analyse solutions to problems related to Fluid Mechanics.
- 3. Describe, utilise, and solve problem related to steady flow in pipe networks using quantity balance and head balance methods.
- 4. Describe, utilise, and solve problem of pumping system.
- 5. Design and handle laboratory work. Collect, analyse and interpret data. Report laboratory work in fluid mechanics.

- 1. Demun, A.S. (2017). Civil Engineering Fluid Mechanics Problems and Solutions. First Edition, Penerbit UTM Press, Johor Bahru, Malaysia.
- 2. Yunus, A. C., & John M. Cimbala, (2014). Fluid Mechanics: Fundamentals and Applications, Mc Graw Hill.
- 3. Fatimah, M. N., Faridah, J. S., & G. K. Goh (1991). *Mekanik Bendalir Untuk Kejuruteraan Awam. UTM, Johor: Unit Penerbitan Akademik.*
- 4. E. John Finnermore, & Joseph B. Franzini, (2006). Fluid Mechanics with Engineering Application, Tenth Edition, McGrawHill.

#### COURSE CODE : ECC 3323 COURSE NAME : CONSTRUCTION MATERIALS AND TECHNOLOGY BAHAN DAN TEKNOLOGI PEMBINAAN

3 Credit Hours Pre-requisite : None

## Course Synopsis

This course is divided into two parts. The first part will address the types of materials used in the construction industry, meanwhile the second part will expose the element of conceptual design and construction technology. This course also provides students the knowledge and understanding of the principles, concepts and processes of constructing a building.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Recognize the characteristics and properties of different types of construction materials.
- 2. Explain and identify the usage and application of different types of construction materials in construction industry.
- 3. Understand site layout, temporary facilities, construction plants and machineries used in the construction sites.
- 4. List and describe the type of foundation, scaffolding, retaining wall ,and formworks used in construction sites.

- 1. Marotta, Theodore W., Basic Construction Materials, Seventh Edition, Pearson Prentice Hall: New Jersey, 2005.
- 2. Chudley . R. Advanced Construction Technology, 3<sup>Rd</sup> Edition. Kuala Lumpur; Addison Wesley Longman Limited, 2002.
- 3. Neville A.M. & Brook J.J. Concrete Technology. Longman. 1990.

COURSE CODE : ECC 3402 COURSE NAME : ENGINEERING GEOLOGY KEJURUTERAAN GEOLOGI

2 Credit Hours Pre-requisite : None

## Course Synopsis

This is a fundamental subject that will expose students in understanding to the phenomenon concept of earth formation and discussing on relationship between geology and civil engineering. The topic covered include elements, mineral, rocks properties and rocks formation (i.e. igneous, sedimentary and metamorphic). The geologic time scale, geomorphology and weathering effect on construction activities in rock mass will also be discussed accordingly. Rock mechanics principles and rock classification systems will be exposed to students in designing civil engineering structure in rock mass.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Able to describe fundamental concept of earth formation, the relationship between geology and civil engineering and the importance of geological consideration in civil construction
- 2. Able to identify and differentiate geological materials such as elements, minerals, formation and composition of igneous, sedimentary and metamorphic rock
- 3. Able to describe geologic time scale, geomorphology and weathering effect on construction activities in rock mass
- 4. Able to apply fundamental rock mechanics principles and classification system in designing civil engineering structure in rock mass

- 1. McLean, A. C. (1985). *Geology for Civil Engineer*. E & F N Spon, London.
- 2. Physical Geology 14th Edition (International Edition) by Charles (Carlos) Plummer, Diane Carlson, Lisa Hammersley (2013), McGraw-Hill, New York.
- 3. Exploring Geology 3rd Edition (International Edition) by Stephen Reynolds, Julia Johnson, Paul Morin, Chuck Carter (2013), McGraw-Hill, New York.

#### COURSE CODE : ECC 3413 COURSE NAME : MECHANICS OF STRUCTURES MEKANIK STRUKTUR

3 Credit Hours Pre-requisite : Must have passed Mechanics of Materials (ECC 3333)

## Course Synopsis

This is a core subject. It will expose the students to the mechanics of structures and fundamental of structural analysis. The topics covered include introduction to structures and loads, analysis of statically determinate structures and trusses, analysis of cables and arches, influence lines, analysis of statically indeterminate structures, analyse deflection and displacement using various methods.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Identify determinacy and stability of structures. Further, analyse statically determinate structures including internal loadings in structural members.
- 2. Analyse cables and arches, and influence line for statically determinate structures.
- 3. Analyse statically indeterminate trusses, beam or frame using double integration method, geometrical methods, virtual work method, slope and deflection equations, and moment distribution methods.

- 1. Hibbeler, R. C. (2015). Structural Analysis. 9<sup>th</sup> Ed. SI. Singapore: Prentice-Hall.
- 2. McKenzie William M.C. (2013). Engineering Mechanics: Examples in Structural Analysis, Second Edition 2nd edition. CRC Press.
- 3. Aslam Kassimali (2015). Structural Analysis 5<sup>th</sup> Edition. SI Edition. CENGAGE Learning
- 4. Yusof Ahmad (2004). *Teori Struktur. Penerbit UTM*
- 5. Ghali, A. & A.M. Neville. 1982. Structural Analysis. London: Chapman & Hall

COURSE CODE : ECC 3423 COURSE NAME : ENGINEERING HYDROLOGY HIDROLOGI KEJURUTERAAN

3 Credit Hours Pre-requisite : None

# Course Synopsis

The course emphasizes hydrology and its application in the field of engineering especially those related to water resources. Interdisciplinary aspects of hydrology that will be introduced and discussed are the understanding of the hydrological processes. These processes are precipitation, evaporation, transpiration, surface runoff, infiltration and interception. Some processes will be discussed in more detail as compared to the others. An introduction to flood estimation will be highlighted together with the basic analysis and concept design in accordance to local guideline of Urban Storm water Management Manual for Malaysia (MSMA). Frequency analysis is the final topic to be discussed in this subject. A brief introduction to the hydrological modelling processes will be introduced as a basic requirement to the understanding to the empirical and numerical modelling concepts.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Describe the basic concepts of hydrological cycle, river basin and application of the water balance.
- 2. Apply the techniques, skills and use various hydrological data such as rainfall data, river flow measurement data and hydrological losses data.
- 3. Conceptualize, develop and able to solve hydrological problem such as flood routing, hydrograph analysis, Modified Rational Method, and frequency analysis.
- 4. Associate the course content to the present hydrologic design Guidelines; Hydrological Procedures (HP) and Urban Storm water Management Manual for Malaysia (MSMA).
- 5. Work in a team or individually to solve problems and produce written report.

- 1. Martin, W., Robert, K., & Ron, E., (1997). HYDROLOGY: Water Quantity and Quality Control. 2<sup>nd</sup> Edition. Jon Wiley & Sons, Inc.
- 2. Victor M. P., (1989). ENGINEERING HYDROLOGY: Principles and Practices. Prentice-Hall, Inc.
- 3. David C., (2006). Water-Resources Engineering. 2<sup>nd</sup> Edition. Pearson Education, Inc.
- 4. Ayob K. Zulkifli Y. & Kawi B., (2007). Hidrologi Asas. Pearson Prentice Hall.

#### COURSE CODE : ECC 3432 COURSE NAME : GRAPHICS AND ENGINEERING DRAWINGS LUKISAN KEJURUTERAAN

2 Credit Hours Pre-requisite : None

## Course Synopsis

This course will expose students to knowledge and understanding of fundamental technical drawing. It will cover basic principles of technical drawing such as dimension, scale, type of lines and also orthographic and isometric drawings, and also introduction to computer aided drawing software. Students will also be introduced to architectural and structural drawings so that they will be able to draw, interpret and understand construction and engineering drawings.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Appreciate technical drawing rules and apply the knowledge using technical drawing instrument.
- 2. Project and visualize orthographic views, isometric views and oblique views of different objects of various shapes, using technical drawing rules and principles.
- 3. Comprehend and produce architectural and structural drawing.
- 4. Work in a group and carry out both architectural and structural drawing project.

- 1. Elsheikh, Ahmed. Introduction to Drawing for Civil Engineers. 1995. McGraw-Hill International.
- 2. David L. Goetsch. Structural Drafting. 1994. Delmar Publisher Inc.
- 3. Mark W. Huth. Understanding Construction Drawing. 2005. Thomson Delmar Learning.
- 4. Yarwood, A. Introduction to AUTOCAD 2008-2D and 3D Design. 2007. Elsevier Ltd.

#### COURSE CODE : ECC 3443 COURSE NAME : STRUCTURAL ANALYSIS ANALISIS STRUKTUR

3 Credit Hours

Pre-requisite : Must have taken Mechanics of Structures (ECC 3413)

## Course Synopsis

This is a core course which provides a basic understanding to the students on the analysis methods for statically indeterminate structures of beam, frame and truss. These structures can be analysed using flexibility and stiffness matrix approaches. Through this analysis, the reactions, internal shear and moments, deflection, slope and support reaction of the structures can be determined. Besides, this course also covers the fundamental of plastic analysis method for both beam and frame structures. In addition, students also will be introduced to finite element method and experienced to analysing various types of structures by using computer software.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Define and explain the significance of structural analysis in the Civil Engineering context.
- 2. Analyse beams, frames and trusses using Flexibility method.
- 3. Analyse beams, frames and trusses using Stiffness method.
- 4. Analyse beams and frames using Plastic analysis method.
- 5. Apply the fundamental Finite Elements Method and analyse the structures using computer software.

- 1. R. C. Hibbler (2015). Structural Analysis 9<sup>th</sup> Edition in SI Units. Prentice Hall.
- 2. Siti Hawa Hamzah. Ching Hua Go., Siong Wee Lee. (2010). Flexibility Method for Structures. UiTM Press.
- 3. Aslam Kassimali (2015). Structural Analysis 5<sup>th</sup> Edition. SI Edition. CENGAGE Learning.
- 4. Daryl L. Logan (2015). A First Course in the Finite Element Method 6<sup>th</sup> Edition. International Student Edition. Thomson.
- 5. Ghali, A., A.M. Neville & T.G. Brown. (2013). Structural Analysis: A Unified Classical and Matrix Approach. 5<sup>th</sup> Ed. London. CRC Press

#### COURSE CODE : ECC 3453 COURSE NAME : WATER SUPPLY AND SEWERAGE BEKALAN AIR DAN PEMBETUNGAN

3 Credit Hours Pre-requisite : None

# Course Synopsis

This subject consists of two main branches in Civil Engineering; water supply and sewerage. Water supply consists of hydrologic cycle, water resources determination, water intake, water treatment processes, water quality control and disinfection, and water distribution system. Sewerage consists of wastewater management related regulations, wastewater properties and effects to environment, sewer systems and removal of suspended matter, dissolved organic matter and colloid using physical, chemical and biological processes. It also includes the removal of nutrients and sludge management.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Understand and describe the basic concepts of chemistry and microbiology related to water supply and sewerage treatment technology.
- 2. Apply and distinguish the methods commonly used in treating water supply and sewerage.
- 3. Calculate and design systems of unit operations of water supply and sewerage to achieve the required treatment.
- 4. Design and handle laboratory work. Collect, analyse and interpret data. Report laboratory work in water supply and sewerage treatment.

- 1. Davis, M. L. and Cornwell, D. A. (2013). Introduction to Environmental Engineering. 5<sup>th</sup> ed. McGraw Hill.
- 2. American Water Works Association/American of Society of Civil Engineer (1998). Water Treatment Plant Design. 3<sup>rd</sup> Ed. McGraw Hill.
- 3. Hammer, M.J., (1996): Water and Wastewater Technology. 3<sup>rd</sup> Ed. Prentice-Hall Inc.
- National Water Services Commission (SPAN), Malaysian Sewerage Industry Guidelines (MSIG) Volume II: Sewerage Works Procedures, 2<sup>nd</sup> ed. 2013 Volume III: Sewer Networks and Pumping Stations, 3<sup>rd</sup> Ed., 2009 Volume IV: Sewage Treatment Plants, 3<sup>rd</sup> Ed., 2009 Volume V: Septic Tanks, 3<sup>rd</sup> ed., 2009

COURSE CODE	: ECC 3463
COURSE NAME	: SOIL MECHANICS
	MEKANIK TANAH

3 Credit Hours Pre-requisite: None

## Course Synopsis

This course is one of the core engineering subjects that will provide solid fundamental knowledge to students about properties and behaviour of soils for geotechnical engineering practice. Topics for the subject are engineering properties of soil, water in soil, shear strength of soil and stresses in soil mass. Students are also required to carry out compulsory laboratory test besides attending lectures and tutorials class.

#### **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Describe the fundamental characteristic of soil such as particle size, distribution and classification, soil composition and relationship, and plasticity.
- 2. Describe the effect of capillarity in soil, permeability, seepage and solve the problem related to the flow net in a dam structure.
- 3. Define shear strength of soil, and determine shear strength parameters of soil.
- 4. Utilise and apply suitable techniques to calculate soil stresses in a soil mass.

- 1. Das, B. M., (2016). Fundamentals of Geotechnical Engineering Ninth Edition, Cencage Learning.
- 2. J.N. Cernica, (1995), Geotechnical Engineering: Soil Mechanics, John Wiley & Sons.
- 3. Craig, R. F. (2004). Soil Mechanics. Seventh Edition, Spon Press.

COURSE CODE	: ECC 3473
COURSE NAME	: GEOMATICS
	GEOMATIK

3 Credit Hours Pre-requisite : None

## Course Synopsis

This course provides the basic theory and practice of surveying to civil engineering students. Methods of establishing horizontal & vertical controls for construction and design are explained and compared. Detailing for producing site plans, area and volume estimations, road curves geometric design are also discussed. Error analysis and adjustment are described. The concept of field survey automation and the usage of software are explained. Common methods of field producers, bookings and reduction of observations are adopted. Since accuracy of survey work is vital in ensuring designs are exactly positioned, students must be able to analyses errors so that standard accuracies are met. At the end of the course students are expected to be able to plan, execute, compute and analyses surveying works involved in establishing horizontal & vertical controls and producing plans for civil engineering applications, perform area calculations and volume estimation for earthwork activities in civil engineering. Students should demonstrate effective communication and good collaborative skills.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Recognise the area of surveying and able to perform calculations and checks for determining heights by levelling, horizontal and vertical angles, traverse coordinates, earthworks quantities and etc.
- 2. Operate survey equipment such as theodolite, total stations and global positioning system (GPS) for field works with confidence.
- 3. Conduct field works in a team and function responsively within a team by upholding ethics in decision making.

- 1. Uren, J. & W.F Price, 2006. Surveying for Engineers, The Macmillan Press Ltd. & ELBS, London Fourth Edision.
- 2. McCormac, J.C., 1991. Surveying: Fundamentals, 2<sup>nd</sup> Ed., Prentice Hall, Englewood Cliffs, New Jersey.
- 3. Shepperd, F.A., 1981. Advanced Engineering Surveying Problem & Solution, Edward Arnold, London.

#### COURSE CODE : ECC 3503 COURSE NAME : REINFORCED CONCRETE DESIGN I REKABENTUK KONKRIT BERTETULANG I

3 Credit Hours

Pre-requisite : Must have passed Mechanics of Structures (ECC 3413)

# Course Synopsis

Reinforced Concrete (RC) Design I is a core civil engineering subject which provides students with the basic theory and design procedures for reinforced concrete structures according to Eurocode 2 (EN 1992). In this course, the syllabus only covers mechanical properties of reinforced concrete, limit state design, analysis of the structure at the ultimate limit state, analysis of the section, shear, torsion, anchorage, curtailment, connections, serviceability, durability and stability. Besides, this course also focuses more on the design of reinforced concrete beams and slabs in various situations. In addition, students have to work in groups and are required to conduct a Reinforced Concrete design project, where they are asked to analyse, design and draw detailed drawing of given structures using manual calculation. This course is a Pre-requisite subject to Reinforced Concrete (RC) Design II.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Elaborate on basic principles of structural analysis and design, mechanical properties of reinforced concrete, limit state design. Also, analyse reinforced concrete structures at ultimate limit state.
- 2. Analyse the section, shear, and torsion. Also, identify the requirement of anchorage, curtailment and member connections, serviceability, durability and stability.
- 3. Analyse, design and produce detailed drawing for reinforced concrete beams and slab.
- 4. Work in a group and carry out project on various reinforced concrete structures.

- 1. Mosley, B., Bungey, J., & Hulse, R. (2007). Reinforced Concrete Design to Eurocode 2, 6th Ed. Hampshire: Palgrave Macmillan.
- 2. Martin, L.H. & Purkiss, J.A. (2006). Concrete Design to EN 1992, 2nd Ed. Oxford: Butterworth-Heinemann.
- 3. British Standard Institution, BS EN 1991-1-1:2002, Eurocode 1– Actions on Structures, BSI, 2002.
- 4. British Standard Institution, BS EN 1992-1-1:2004. Eurocode 2: Design of Concrete Structures. Part 1-1: General rules and rules for buildings London: BSi.
- 5. NA to BS EN 1992-1-1:2004. UK National Annex to Eurocode 2: Design of Concrete Structures. London: BSi.
- 6. STANDARDS MALAYSIA. MS EN 1990 (2010). Eurocode: Basis of structural design. MS, 2010 1a. Malaysia National Annex to Eurocode. Malaysian Standards.
- 7. STANDARDS MALAYSIA. MS EN 1991 (2010). Eurocode 1: Actions on structures. MS, 2010 2a. Malaysia National Annex to Eurocode 1. Malaysian Standards.
- 8. STANDARDS MALAYSIA. MS EN 1992 (2010). Eurocode 2-Part 1-1: Design of concrete structures-General Rules and Rules for Buildings. MS, 2010 3a. Malaysia National Annex to Eurocode 2. Malaysian Standards.

COURSE CODE	: ECC 3513
COURSE NAME	: GEOTECHNICS
	GEOTEKNIK

3 Credit Hours Pre-requisite : Must have taken Soil Mechanics (ECC 3462)

# Course Synopsis

This course is one of the core engineering subjects that will provide essential understanding to students on principle knowledge in geotechnical engineering field. Topics for the subject are soil compaction, lateral earth pressure and retaining wall, slope stability and soil compressibility. Students are also required to carry out compulsory laboratory test besides attending lectures and tutorials class.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Describe the fundamental of soil compaction, factors affecting compaction, field and laboratory compaction test and application.
- 2. Describe and analyse the lateral earth pressure, checking stability of retaining wall structures and applying few methods of analysis.
- 3. Define concept of slope stability, slope movement and instability, and applying slope stability analysis.
- 4. Understand compressibility in soil, consolidation and settlement, and apply consolidation concept through understanding on degree and rate of consolidation.

- 1. Das, B. M., (2016). Fundamentals of Geotechnical Engineering Ninth Edition, Cencage Learning.
- 2. J.N. Cernica, (1995), Geotechnical Engineering: Soil Mechanics, John Wiley & Sons
- 3. Craig, R. F. (2004). Soil Mechanics. Seventh Edition, Spon Press.

COURSE CODE : ECC 3523 COURSE NAME : HIGHWAY ENGINEERING KEJURUTERAAN LEBUH RAYA

3 Credit Hours Pre-requisite : None

## **Course Synopsis**

This is a compulsory course that will expose students to the fundamental theory of Highway Engineering. This course emphasises on highway earthwork, operations and equipment, highway materials, highway drainage, geometric design of roads and furniture, pavement design and highway maintenance and rehabilitation. Students are required to carry out laboratory testing at the highway laboratory besides attending lectures and tutorials. Moreover, students are required to write reports on all laboratory testing, analyse and solve problems related to laboratory testing, assignments and tutorials. Last but not least, students will be exposed to software for road geometric design and they are required to carry out mini projects in groups.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Identify and distinguish highway earthwork, operations and equipment, and solve problems related to earthwork operations.
- 2. Describe, identify and compare the highway materials and tests.
- 3. Recognize, compare and classify types of highway drainage.
- 4. Analyse and design the geometric of roads and furniture.
- 5. Analyse, design and recommend the structural thickness of flexible pavement using JKR method and rigid pavement using PCA method.

- 1. Garber, N.J. & Hoel, L.A. (2015). Traffic and Highway Engineering. 5<sup>th</sup> Ed. Cengage Learning.
- 2. Arahan Teknik Jalan 5/8 Manual on Pavement Design. Jabatan Kerja Raya.
- 3. REAM GM2/2002 A Guide on Geometric Design of Roads. Road Engineering Association Malaysia.
- 4. Wright, P.H. & Dixon, K.K. 2004. Highway Engineering. 7<sup>th</sup> Ed. John Wiley & Sons.

#### COURSE CODE : ECC 3532 COURSE NAME : CIVIL ENGINEERING PROJECT MANAGEMENT PENGURUSAN PROJEK KEJURUTERAAN AWAM

2 Credit Hours Pre-requisite : None

## Course Synopsis

The course starts with the project management concept, role of project manager and function of project management from inception until completion. The second part of the course will include the usage of tools available in construction management particularly in the application of planning and scheduling technique using Gantt Chart and network technique. The course will also expose the students to the application of scheduling software available in the market.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Provide an overview of the construction industry and the role of its players
- 2. Understand the general concept of project management principles including its organization structure
- 3. Plan, schedule and control civil engineering projects using various techniques
- 4. Develop a project work programme using planning tools

- 1. Project Management in Malaysia by Andrew A. L. Tan.
- 2. Barrie, D.S & Paulson, B.C, Profesional Construction Management, Mc Graw Hill (1999).
- 3. Harris, F. & Mc Caffer, R, Modern Construction Management, Publishing, London (1995)

#### COURSE CODE : ECC 3543 COURSE NAME : REINFORCED CONCRETE DESIGN II REKABENTUK KONRIT BERTETULANG II

3 Credit Hours

Pre-requisite : Must have taken Reinforced Concrete Design I (ECC 3503)

# Course Synopsis

Reinforced Concrete (RC) Design II is a core civil engineering subject that exposes students to a wider scope of reinforced concrete design. As a continuation to the Reinforced Concrete Design I, this subject covers analysis and design of foundations, staircases, and retaining walls. Furthermore, students will be introduced to basic principles of prestressed concrete and design procedure of composite construction. Students have to work in groups and are required to conduct a Reinforced Concrete design project, where they are asked to analyse, design and draw detailed drawing of a given structures using manual calculation. Students will also be exposed to function and use of Reinforced Concrete design software. This course is a Pre-requisite subject to Structural Design Project (Capstone II).

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Analyse, design and produce detailed drawing for reinforced concrete foundations, staircase and retaining walls.
- 2. Describe and explain the basic principles of prestressed concrete and design procedures of composite construction.
- 3. Work in groups and carry out project on various reinforced concrete structures.

- 1. Mosley, B., Bungey, J., & Hulse, R. 2007. Reinforced Concrete Design to Eurocode 2, 6th Ed. Hampshire: Palgrave Macmillan.
- 2. Martin, L.H. & Purkiss, J.A. 2006. Concrete Design to EN 1992, 2nd Ed. Oxford: Butterworth-Heinemann.
- 3. BS EN 1992-1-1:2004. Eurocode 2: Design of Concrete Structures. Part 1-1: General rules and rules for buildings London: BSi.
- 4. British Standard Institution, BS EN 1991-1-1:2002, Eurocode 1– Actions on Structures, BSI, 2002.
- 5. British Standard Institution, BS EN 1992-1-1:2004. Eurocode 2: Design of Concrete Structures. Part 1-1: General rules and rules for buildings London: BSi.
- 6. NA to BS EN 1992-1-1:2004. UK National Annex to Eurocode 2: Design of Concrete Structures. London: BSi.
- 7. STANDARDS MALAYSIA. MS EN 1990 (2010). Eurocode: Basis of structural design. MS, 2010 1a. Malaysia National Annex to Eurocode. Malaysian Standards.
- 8. STANDARDS MALAYSIA. MS EN 1991 (2010). Eurocode 1: Actions on structures. MS, 2010 2a. Malaysia National Annex to Eurocode 1. Malaysian Standards.
- STANDARDS MALAYSIA. MS EN 1992 (2010). Eurocode 2-Part 1-1: Design of concrete structures-General Rules and Rules for Buildings MS, 2010 3a. Malaysia National Annex to Eurocode 2. Malaysian Standards.

COURSE CODE	: ECC 3553
COURSE NAME	: HYDRAULICS
	HIDRAULIK

3 Credit Hours Pre-requisite : Must have taken Fluid Mechanics (ECC 3343)

## Course Synopsis

The aim of this course is to give knowledge, understanding and able to design open channel hydraulics (erodible and non-erodible). This course also identifies open channel flow classification, design of channel section dimensions, flow characteristics in open channel, sediment transport. This course also introduces commercial software which is used in open channel design.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Describe characteristics of open channel flow and application of various channel design equations in uniform flow.
- 2. Calculate and define flow profile in non-uniform flow due to control structures in the channel.
- 3. Identify and calculate the hydraulic jump occurred in the channel.
- 4. Calculate and evaluate rapidly and gradually varying flow in open channel.
- 5. Describe and understand concept of sediment transport in open channel and design using computer's software.
- 6. Work in a team or individually to solve problems and produce written report.

- 1. Hubert Chanson. 2004. Hydraulics of Open Channel Flow. 2nd Edition. Butterworth-Heinemann.
- 2. Terry W. Sturn (2001). Open Channel Hydraulics. Mc Graw Hill- Higher Education.
- 3. Amat Sairin Demun (1997) Hidraulik Saluran Terbuka Dengan Penggunaan Komputer, Penerbitan Universiti Teknologi Malaysia, Skudai Johor.
- 4. Fatimah, M(1996), *Hidraulik Kejuruteraan Awam, Teori, Masalah dan Penyelesaian, Penerbitan Universiti Teknologi Malaysia, Skudai, Johor.* (Translation of Featherstone, R.E dan Nalluri, C., Civil Engineering Hydraulics Essential Theory with Worked Examples).

## COURSE CODE COURSE NAME

#### : ECC 3563 : FOUNDATION ENGINEERING KEJURUTERAAN ASAS

3 Credit Hours Pre-requisite : Must have taken Geotechnics (ECC 3513)

# Course Synopsis

In this subject, the application of soil mechanics principles to foundation design will be highlighted. The course covers the following topic: site investigation, shallow foundation, deep foundation, soil dynamic, foundation instrumentations and field testing, and machine foundation.

# **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Identify types of foundation system and foundation stability criteria.
- 2. Evaluate bearing capacity and settlement, pile capacity and settlement, and carry out geotechnical design for foundation work.
- 3. Propose appropriate instrumentation techniques for assessment of foundation performance.
- 4. Relate different methods of site investigation for different site conditions.

- 1. Bujang Kim Huat, Faisal Hj Ali, Hussaini Omar, Haruant Sigh (2006), Foundation Engineering; Design and construction in tropical soil. Taylor & Francis group.
- 2. Das, B.M (Sixth ed.), Principles of Foundation Engineering, Thomson, California.
- 3. Tomlinson & Michael, J. (1995), Pile Design and Construction, 6th. Edition. John Wiley and Sons, New York.
- 4. Bowles, J.E (1996), Foundation Analysis and Design, McGraw Hill International editions.

#### COURSE CODE : ECC 3573 COURSE NAME : TRANSPORTATION ENGINEERING KEJURUTERAAN PENGANGKUTAN

3 Credit Hours Pre-requisite : None

## Course Synopsis

This is a compulsory course that will expose students to the fundamental theory of Transportation Engineering. The content of the course gives knowledge, understanding and synthesis in major field of transportation engineering. This course emphasizes on traffic engineering studies, traffic flow characteristics, traffic control, traffic management, traffic analysis techniques, transit operation and public transport, parking, transportation safety, transportation system issues and challenges. Students are required to carry out field experiments besides attending lectures and tutorials. Students are required to write reports on all experiments, analyse and solve problems related to experiments, assignments and tutorials. Besides, the students are required to carry out mini project in groups.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Recognise and distinguish traffic engineering studies; demonstrate and analyse the traffic flow characteristics.
- 2. Identify, analyse, design and summarize road traffic control and management system.
- 3. Describe and express the concept of transit operation; prepare, classify and design the public transport and parking facilities.
- 4. Express the importance of transportation safety, identify the deficiencies in transportation system and recommend countermeasures to overcome the deficiencies in transportation system.

- 1. Garber, N.J. & Hoel, L.A. (2015). Traffic and Highway Engineering. 5<sup>th</sup> Ed. Cengage Learning.
- 2. Banks, J.H. 2002. Introduction to Transportation Engineering. 2<sup>nd</sup> Ed. McGraw-Hill.
- 3. Kutz, M. Handbook of Transportation Engineering. 2004. McGraw-Hill.
- 4. Wright, P.H. & Ashford, N.J. 1998. Transportation Engineering: Planning & Design. 4<sup>th.</sup> Ed. New York: John Wiley.
- 5. Arahan Teknik Jalan 13/87-Manual on a Guide to the Design of Traffic Signal. Jabatan Kerja Raya.
- 6. REAM GM2/2002 A Guide on Geometric Design of Roads, Road Engineering Association Malaysia.

COURSE CODE	: ECC 3584
COURSE NAME	: INDUSTRIAL TRAINING
	LATIHAN INDUSTRI

4 Credit Hours Pre-requisite : Passed 60 Credits Hours

## Course Synopsis

Industrial training exposes students to the real work setting in various industries or military units for 10 weeks. The students are placed in industries or military units that best suit their area of studies. It is an experimental learning that requires the students to learn the process and able to apply their knowledge acquired in actual industrial setting. The knowledge acquire during practical training may be used later in final year class as well as to equip them with sufficient knowledge for their job.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Experience and gain engineering knowledge, which are required in industry and not taught in the lecture rooms.
- 2. Apply the engineering knowledge taught in the lecture rooms in real industrial situations.
- 3. Gain experience on engineering procedural work flow management and implementation, technical report writing in engineering works/projects to face real problems in engineering field.
- 4. Practise responsibilities and code of ethics as engineers.

## Reference

Industrial Training Guideline. Industrial Training Committee, Faculty of Engineering, UPNM

#### COURSE CODE : ECC 3603 COURSE NAME : STEEL AND TIMBER STRUCTURES DESIGN REKABENTUK STRUKTUR KELULI DAN KAYU

3 Credit Hours Pre-requisite : Must have taken Mechanics of Structures (ECC 3413)

# Course Synopsis

This is a core course. It will expose the students to the analysis and design of steel and timber structures. For the steel design, the topics covered include the advantages and the general concepts of steel constructions, analysis and design of restrained and unrestrained beams, design of tension and compression members, columns with axial load, columns with axial load and bending moment, bolt and weld connections. For timber structures, the topics covered include the design of beams, columns, and compression and tension members of truss.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Describe the steel and timber design concept and elaborate the advantages and disadvantages of steel and timber structures compare to other types of structure.
- 2. Analyse actions on structure, calculate design loads and analyse structural elements.
- 3. Design steel & timber structures, i.e. beams, columns, and connections, using current code of practice.
- 4. Work in a team, to prepare structural design report, drawing plan and structural element detailing, professionally and ethically, and to present it with standard communication skill.

- 1. L.H. Martin & J.A. Purkiss, Structural Design of Steelwork to EN 1993 and EN 1994 3rd Edition, Butterworth-Heinemann, UK, 2008.
- 2. N.S. Trahair, M.A. Bradford, D.A. Nethercot and L. Gardner, The Behaviour and Design of Steel Structures to EC3 4th Edition, Taylor & Francis, 2009.
- 3. Mat Lazim Zakaria, *Rekabentuk Struktur Kayu menurut MS 544, Dewan Bahasa dan Pustaka: KL,* 1989.
- 4. British Standard Institution, BS EN 1991-1-1:2002, Eurocode 1– Actions on Structures, BSI, 2002.
- 5. British Standard Institution, BS EN 1993-1-1:2005, Eurocode 3–Design of Steel Structures- BSI, 2005.

COURSE CODE : ECC 3613 COURSE NAME : ENVIRONMENTAL ENGINEERING KEJURUTERAAN ALAM SEKITAR

3 Credit Hours Pre-requisite : None

## Course Synopsis

This course covers broad aspects of environmental pollution and control. Students are exposed to subject matters related to water, air and soil pollution. Sources, effects, engineering control measures and related laws and regulations are discussed. Other topics include solid and hazardous waste management, environmental impact assessment and environmental management system.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Identify and discuss on pollutants and their effects to environment especially human.
- 2. Understand some concepts related to pollutant dispersion and self cleansing of environmental system.
- 3. Identify and make simple design of pollution control methods or equipment.
- 4. Understand some of the Malaysian laws and regulations pertaining to environmental pollution control and concepts of environmental impact assessment and environmental management system.

- 1. Davis, M.L & Cornwell, D.A, Introduction to Environmental Engineering, 5<sup>th</sup> Edition, McGraw Hill, (2013).
- 2. Peavy, H.S, Donald, R.R & George, T, (1985), Environmental Engineering, McGraw Hill, 1985RC & Steel Design.
- 3. Environmental Quality Act and Regulations (Act 127).

#### COURSE CODE : ECC 3622 COURSE NAME : INFRASTRUCTURE DESIGN PROJECT (CAPSTONE I) PROJEK REKABENTUK INFRASTRUKTUR (CAPSTONE I)

2 Credit Hours Pre-requisite : None

## Course Synopsis

This course is tailored to expose and familiarise students to relevant design code requirements for civil engineering/infrastructure works. The subject focuses on the implementation of infrastructure design and technical report writing of the proposed projects. Working in groups, student will simulate design team effort preparing local authorities submission procedures for approval of infrastructure works. The content of this subject covers basic infrastructure such as earthworks design, road and drainage design, water reticulation design, sewerage reticulation design and environmental management pertaining to impact assessment.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Use code of practice, manual and guidelines to perform earthworks design, sewerage water reticulation design, external water reticulation design, drainage system design and perform EIA report.
- 2. Work in a project team and produced a technical report on the project.
- 3. Present information and express idea clearly through oral modes.

- 1. Akta Jalan, Parit and Bangunan 1974.
- 2. Urban Strom Water Management Manual (MASMA), 2001.
- 3. MWA Design Guideline for water supply system, 1992.
- 4. Arahan Teknik Jalan.

#### COURSE CODE : ECC 3632 COURSE NAME : FINAL YEAR PROJECT I PROJEK TAHUN AKHIR I

2 Credit Hours

Pre-requisite : Passed in Fluid Mechanics (ECC3313), Soil Mechanics (ECC 3463), Construction Materials and Technology (ECC3323), Mechanics of Materials (ECC3333) dan Mechanics of Structures (ECC3413)

# **Course Synopsis**

All students are required to conduct a final year project for 2 semesters before graduating. Students are required to identify problem(s) related to their project, propose solution to the problem(s), and gather relevant information to solve the problem(s). The Final Year Project I introduces the research methodology to students. Students are required to initiate a research on a selected topic in a systematic manner, conduct intensive literature review, propose solution(s) to the problem (s) and write a project proposal.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Understand, seek and define the research topic, objectives and scope of work.
- 2. Search information related to research project.
- 3. Design the project methodology to achieve the expected outcome.
- 4. Write a proper project proposal report and technical abstract.
- 5. Present information and express ideas clearly, effectively and confidently through written and oral modes.

## References

Students are expected to find their own reference materials.

#### COURSE CODE : ECC 3642 COURSE NAME : ENGINEERS IN SOCIETY JURUTERA DALAM MASYARAKAT

2 Credit Hours Pre-requisite : None

## Course Synopsis

The course relates to the subject of Engineers in Society. The course first introduces the student with the roles of engineers in Nation Building, followed by their roles in the organization they work and the society they live in. Next, engineering professionalism including familiarity with the Engineers Act is given. The course then discusses the importance of "Ethics" and the need to adhere to it as well as the expectations of the public towards the engineering profession. At the same time, it highlights the issues of integrity and corruption. Finally, the course exposes students with the importance of environmental preservation and safety at work site.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Understand the role of engineers in the society and nation they live in.
- 2. Understand engineering professionalism including the Engineers Act and the route to a professional engineers.
- 3. Appreciate the importance of environmental preservation and ensuring health and safety in every construction project.
- 4. Be more responsive on the importance of moral values and the need to adhere to ethics as an engineer.
- 5. Apply the knowledge in ethics and professionalism to resolve problems and issues they encounter in engineering professionalism.

- 1. Arazi Idrus, Shahrin A Sulaiman & Mohd Faris Khamidi.(2010). Engineers in Society. Mc GrawHill, Malaysia.
- 2. Mike W. Martin Ronald Schinzinger. (2005). Ethics in Engineering. 4<sup>th</sup> edition: McGraw Hill.
- 3. Carl Mitham & R. Shannon Duvall. (1999) Engineer's Toolkit. Prentice Hall.
- 4. Alastair S. Gunn & P. Aarne Vesilind.(2003). The Engineer's Responsibility to Society. Thomson & Brooks/Cole

#### COURSE CODE : ECC 3652 COURSE NAME : ENGINEERING CONTRACT, ESTIMATION AND ECONOMICS KONTRAK KEJURUTERAAN, PENTAKSIRAN DAN EKONOMI

2 Credit Hours Pre-requisite : None

## Course Synopsis

This course consists of three parts. The first part will start with an overview of the construction industry and then expose students to the basic knowledge of construction contracts and its management, types of tender, tendering process, preparation of tender documents, and strategies in tendering. Meanwhile, the second part covers the introduction to the methods of estimating and the preparation of the Bill of Quantities for construction project. The third part will expose students to engineering economics.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Apply the basic knowledge regarding construction tender and contract.
- 2. Understand cost concept in engineering works.
- 3. Estimate the cost of building elements and civil engineering works.
- 4. Do basic calculation in engineering economy.
- 5. Work in a team or individually to solve problems and produce written report.

- 1. Ir. Harbans Singh K.S.(2002). Engineering and construction contracts management pre-contract award practice. Lexis Nexis.
- 2. John Murdoch & Will Hughes(1996). Construction contracts laws and management. London E&FN Spon.
- 3. Ahmad Abdullah & Khairuddin Abd Rashid (2004). *Pengukuran Kuantiti Bangunan.* 2<sup>nd</sup> Ed. Pearson Prentice Hall.
- 4. Pratt, D (2004). Fundamentals of Construction Estimating, 2<sup>nd</sup> Ed. Thomson, Delmar Learning.
- 5. John A White, Kenneth E Case, Davib B Pratt and Marvin H Agee (2000). Principles of Engineering Economics Analysis, 4<sup>th</sup> Edition. John Wiley.

#### COURSE CODE : ECC 3662 COURSE NAME : STRUCTURAL DESIGN PROJECT (CAPSTONE II) PROJEK REKABENTUK STRUKTUR (CAPSTONE II)

2 Credit Hours

Pre-requisite : Must have taken Reinforced Concrete Design II (ECC 3543) or Steel and Timber Structures Design (ECC 3603)

# **Course Synopsis**

This course is to provide an understanding and skills in designing civil engineering structures. In this course, students will be trained to work effectively in a team and will be able to carry responsibility for individual task. They will also attend lectures given by industry practitioners to expose themselves to real design practice. Furthermore, students will be trained to produce report and present the project with effective communication skill. The students will either continue the project given from previous Capstone I course project, or start from a new requirement, new sketch, or site visit to a new proposed building project. For Capstone II, students are required to start with preparing the preliminary design concept for a structure. Then to prepare functional and structural layout plan, to analyse and design the structure, and detailing on the structural elements. The students are also required to produce sample take-off sheets, cost estimation and project planning and scheduling.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Prepare structural design concept base on client requirement including preparing functional and structural layout plan.
- 2. Analyse and design selected structure including drawing and detailing.
- 3. Produce sample take-off sheets and performed cost estimation.
- 4. Professionally prepare full report including plan for project implementation.

- 1. Martin, L.H. & Purkiss, J.A. 2006. Concrete Design to EN 1992, 2<sup>nd</sup> Ed. Oxford: Butterworth-Heinemann
- 2. Mosley, B., Bungey, J., & Hulse, R. 2007. Reinforced Concrete Design to Eurocode 2, 6th Ed. Hampshire: Palgrave Macmillan
- 3. Hibbeler, R.C. 2006. Structural Analysis. 6<sup>th</sup>. Edition SI. Singapore: Prentice-Hall.
- 4. British Standard Institution, BS EN 1991-1-1:2002, Eurocode 1– Actions on Structures, BSI, 2002.
- 5 British Standard Institution, BS EN 1992-1-1:2004. Eurocode 2: Design of Concrete Structures. Part 1-1: General rules and rules for buildings London: BSi.
- 6 NA to BS EN 1992-1-1:2004. UK National Annex to Eurocode 2: Design of Concrete Structures. London: BSi.
- 7 STANDARDS MALAYSIA. MS EN 1990 (2010). Eurocode: Basis of structural design. MS, 2010 1a. Malaysia National Annex to Eurocode. Malaysian Standards.
- 8 STANDARDS MALAYSIA. MS EN 1991 (2010). Eurocode 1: Actions on structures. MS, 2010 2a. Malaysia National Annex to Eurocode 1. Malaysian Standards.
- STANDARDS MALAYSIA. MS EN 1992 (2010). Eurocode 2-Part 1-1: Design of concrete structures- General Rules and Rules for Buildings MS, 2010 3a. Malaysia National Annex to Eurocode 2. Malaysian Standards

#### COURSE CODE : ECC 3674 COURSE NAME : FINAL YEAR PROJECT II PROJEK TAHUN AKHIR II

4 Credit Hours Pre-requisite : Must have passed Final Year Project I (ECC 3632)

# Course Synopsis

All students are required to conduct a final year project for 2 semesters before graduating. Students are required to identify problem(s) related to their project, propose solution to the problem(s), and gather relevant information to solve the problem(s). The Final Year Project II is the extension of Final Year Project I. Students are required to complete data collection and analysis, write a dissertation and technical paper. Students are required to present their findings.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Conduct research in a systematic way.
- 2. Interpret, analyse, discuss and make conclusion based on the research findings.
- 3. Write a good thesis and technical paper based on the research.
- 4. Present information and express ideas clearly, effectively and confidently through written and oral modes.

## References

Students are expected to find their own reference materials.

#### SYNOPSIS OF ELECTIVE COURSE PROGRAM (TECHNICAL SPECIALIZATION) BACHELOR OF CIVIL ENGINEERING PROGRAM (ZK01)

#### COURSE CODE : ECC 3713 COURSE NAME : NUCLEAR, BIOLOGICAL AND CHEMICAL CONTAMINATION PENCEMARAN NUKLEAR, BIOLOGI DAN BAHAN KIMIA

3 Credit Hours Pre-requisite : None

# **Course Synopsis**

This is an elective course introducing students to nuclear, biological and chemical (NBC) pollution. The pollutants or agents are either planned or accidentally released to the environment. It will discuss on causes and sources, main effects/symptoms of the pollution. It will also discuss on basic methods and procedures of detection, decontamination and protection. Main equipments for detection, protection and decontamination will also be discussed especially for the safety of military personnel or public.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Describe the properties and concepts of how NBC agents affects human and the environment.
- 2. Explain and utilise the standard procedures of marking contaminated site and identify the decontamination methods and procedures.
- 3. Identify and solve problems on basic principles of transmission, dissemination and detection of the agents and the factors affecting the spread.
- 4. Plan strategies and the steps need to be taken during NBC contamination for self and mass protection.

- 1. Davis, M.L & Cornwell, D.A, Introduction to Environmental Engineering, 5<sup>th</sup> Edition, McGraw Hill, (2013).
- 2. Malaysia Environmental Quality Act and Regulations (Act 127).
- 3. Woodside, G, Hazardous Materials and Hazardous Waste Management.
- 4. Yadav, M.S, Nuclear Weapons and Explosions, Environmental Impacts and Other Effect.

#### COURSE CODE : ECC 3733 COURSE NAME : ADVANCE HIGHWAY ENGINEERING KEJURUTERAAN LEBUHRAYA LANJUTAN ECC 3523

3 Credit Hours Pre-requisite : None

# **Course Synopsis**

This elective course will expand the students' knowledge in highway engineering. The topics include analysis of pavement stresses, methods of modifying asphalts and application of modified asphalts for military roads, new advances of pavement materials and pavement evaluation and maintenance.

## **Course Learning Outcomes**

At the end of this course, students are able to:

- 1. Analyze the pavement distresses
- 2. Identify different types of modified asphalts and its applications.
- 3. Conduct pavement appraisals.

- 1. Y.H. Huang, (2012) Pavement Analysis and Design. Pearson Prentice Hall.
- 2. P.H. Wright, K.K. Dixon, (2004). Highway Engineering, John Wiley & Son.
- 3. Brockenbrough, R.L. (2009). Highway Engineering Handbook. McGraw Hill.

#### COURSE CODE : ECC 3743 COURSE NAME : ADVANCED CONSTRUCTION MATERIALS AND TECHNOLOGY FOR MILITARY APPLICATION BAHAN DAN TEKNOLOGI PEMBINAAN LANJUTAN UNTUK APLIKASI KETENTERAAN

3 Credit Hours Pre-requisite : None

## **Course Synopsis**

This course is divided into two parts. The first part will address the types of contemporary materials used related to high strength and impact resistance structures, meanwhile the second part will expose the construction technology that's being used in military applications. This course also provides students the knowledge of rapid construction and elaboration of the role of military civil engineer.

## **Course Learning Outcomes**

Upon completion of this course, students are able to:

- 1. Describe the advance building materials being used in military applications.
- 2. Describe the advanced construction technology being used in military applications.
- 3. Evaluate the concept of rapid construction.

- 1. Advance Construction and Building Technology for Society (2012), International Council for Research and Innovation in Building and Construction, Germany, 2012.
- 2. Roy Chudley and Roger Greeno (2007). Construction Technology, Pearson. Prentice Hall, United Kingdom.
- 3. Edward Allen and Joseph Iano (2008). Fundamentals of Building Construction Material and Methods.

#### COURSE CODE : ECC 3753 COURSE NAME : STRUCTURE SUBJECT TO BLAST STRUKTUR TERDEDAH KEPADA LETUPAN

3 Credit Hours Pre-requisite : None

## Course Synopsis

This course aims to develop understanding of the explosive law and act in Malaysia, type of military and commercial explosive, explosive storage, safety and also handling procedure, a review of terrorist attack on building, blast phenomena and also blast effect on structure. Besides, students will also expose to the various blast mitigation technique and procedures.

## **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Understand explosive related law, type of explosive and application, explosive storage building, blast loading and also blast effect on structure.
- 2. Work in a project team to produce a report on blast loading and also effect on the building structure.
- 3. Present information and express the idea clearly through oral modes.

- 1. Smith and Hetherington (1994). Blast and ballistic loading of structures. Oxford: Butterworth-Heinemann. ISBN: 0750620242.
- 2. Mays and Smith. (1995). Blast effects on buildings: design of building to optimize resistance to blast loading. Thomas Telford. ISBN: 0727720309.
- 3. Donald O. Dusewnberry (2010). Blast resistance design of building. John Wiley and Sons.
#### COURSE CODE : ECC 3763 COURSE NAME : INTEGRATED WATER RESOURCES MANAGEMENT PENGURUSAN SUMBER AIR BERSEPADU

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This is an elective course aim to equip students with in-depth knowledge in water resources design and management. This course highlights major water resources management issues with the emphasis on the integration of various management components. While the course contents maintain the technical elements of water resources system and engineering, students are also exposed to the realities of the political, economic, and social settings that influent the decision making process. Upon completion of this course, the students should be able to demonstrate the diverse and complicated issues in water resource management, discuss the need and steps for integrated management approach, analyse and determine viable project options, propose appropriate management strategies, and apply the appropriate techniques and strategies in reservoir planning and design.

#### **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Acquire basic knowledge of water resources management.
- 2. Describe the major water resources management issues.
- 3. Select the technical elements of water resources system and engineering.
- 4. Demonstrate the diverse and complicated issues in water resource management.

- 1. Pedro Martinez-Santos, Maite M. Aldaya, M. Ramón Llamas. Integrated Water Resources Management in the 21st Century: Revisiting the paradigm. CRC Press
- 2. Adamowski J, Zyla C, Cuenca E, Medema W, Clamen M, Reig P. 2013. Integrated and adaptive water resources planning, management, and governance. Water Resources Publications LLC. Littleton, Colorado, USA.
- 3. Lenton R. L., Mike Muller (2009). Integrated Water Resources Management in Practice: Management for Development. Earthscan Publishing.

#### COURSE CODE : ECC 3773 COURSE NAME : ENVIRONMENTAL HYDRAULICS AND HYDROLOGY HIDRAULIK DAN HIDROLOGI ALAM SEKITAR

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This course is designed to expose the students to surface water environmental hydraulics. The fundamentals and principles, which underlie the mathematical modeling techniques used to analyze the quality of surface waters are emphasized. Students will be able to build models from mass balance equations, and will appreciate the related environmental disciplines. After completion of the course, students should be able to apply the numerical models for a selected case study and able to familiar with the multi-disciplinary aspects of an engineering project.

#### **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Acquire basic knowledge of environmental hydraulic and hydrology.
- 2. Learn the fundamental and principles of mathematical modeling techniques and build models from mass balance equations.
- 3. Apply the numerical models for a selected case study.

- 1. Andrew Chadwick, John Morfett and Martinn Borthwick (2013). Hydraulics in Civil and Environmental Engineering. CRC Press. Taylor and Francis Group.
- 2. Ghosh S. N., Desai V. R. (2006). Environmental Hydrology and Hydraulics. CRC Press.
- 3. Jayawardena A. W. (2014). Environmental and Hydrological Systems Modelling. CRC Press. Taylor and Francis Group.

#### COURSE CODE : ECC 3813 COURSE NAME : HYDROLOGIC ANALYSIS AND DESIGN ANALYSIS DAN REKABENTUK HIDROLOGI

3 Credit Hours Pre-requisite : None

#### Course Synopsis

The course covers the theoretical aspects and design of urban stormwater drainage system. It is intended to introduce students to the fundamentals of stormwater drainage system design. Methods of hydrologic design, rainfall design, flood estimation, rainfall-runoff relationship and flood routing will be taught. This will involve the planning, analysis, design and management for the quantitative aspect.

#### **Course Learning Outcomes**

At the end of this course students are able to:

- 5. Describe the basic concepts of hydrology process.
- 6. Explain issues in drainage system management and flood control programs.
- 7. Design of drainage structures and flood control mechanisms.
- 8. Incorporate the guidelines in Urban Storm water Management Manual for Malaysia (MSMA) into drainage system design.

- 5. Richard, H. M. (2016). Hydrologic Analysis and Design. 4<sup>th</sup> ed. Pearson.
- 6. Chin, A. D. (2013). Water Resources Engineering. 3<sup>rd</sup> ed. Pearson.
- 7. Urban Storm Water Management Manual for Malaysia" (2000). Department of Irrigation and Drainage Malaysia. Percetakan Nasional Malaysia Berhad.

#### COURSE CODE COURSE NAME

#### : ECC 3783 : INTRODUCTION TO RAILWAYS AND TUNNELS PENGENALAN KEPADA LANDASAN KERETAPI DAN TEROWONG

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This elective course introduces students to the necessity of railways and tunnels as an alternative to roads and highway. The topics for railways cover the systems of railways, design of track geometrics, points and crossings, stations and yards. The topic of tunnels include the classification of tunnels, shape of tunnels, methods of tunneling in hard and soft rocks.

#### Course Learning Outcomes

At the end of this course, students are able to:

- 1. Identify and distinguish the systems of railways.
- 2. Design the geometrics of railways.
- 3. Recognize, compare and classify types of tunnels and methods of tunneling

- 1. Chandra, S., Agarwal, M.M., (2013). Railway Engineering. Oxford University Press.
- 2. Hay, W.W. (1982). Railroad Engineering. Wiley.
- 3. Kuesel, T.R., King, E.H., Bickel, J.O., (1996). Tunnel Engineering Handbook. Springer.
- 4. The British Tunneling Society, (2010). Specification for Tunneling. Thomas Telford Publishing.
- 5. Upadhyay, A.K., (2016). Transportation Engineering. S.K. Kataria & Sons.

#### COURSE CODE : ECC 3793 COURSE NAME : DAMAGE ASSESSMENT, REPAIR AND MAINTENANCE OF CONCRETE STRUCTURES PENILAIAN KEROSAKAN, PEMBAIKAN DAN PENYELENGGARAAN STRUKTUR KONKRIT

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course first introduces students to the subject of concrete durability, and the nature and causes of concrete damage and deterioration. This is followed by methods for structural investigation and damage assessment including the effects on the integrity of the whole structure. Materials and techniques for repair, strengthening, rehabilitation, protection and maintenance are also given. At the end of the course, students are also exposed to the methods of demolition of existing structures.

#### **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Acquire basic knowledge of concrete durability and the process of deterioration.
- 2. Predict the cause of the damage that has occurred to a concrete member and assess the effect on the structure.
- 3. Select the appropriate technique for repairing damaged concrete and method of maintenance.
- 4. Describe techniques of demolishing structures using explosives as well as mechanical means.

- 1. Mays, G.C. Durability of Concrete Structures: Investigation, Repair and Protection. E FN Spon London. 1992.
- 2. Repair and Strengthening of Concrete Structures. FIP Guide to Good Practice. Thomas Telford, 1991.
- 3. Puller-Strecker, P. Corrosion Damaged Concrete: Assessment and Repair.Butterwort for CIRIA, London, 1987.

#### COURSE CODE : ECC 3803 COURSE NAME : INTRODUCTION TO BRIDGE ENGINEERING PENGENALAN KEPADA KEJURUTERAAN JAMBATAN

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This elective course introduces students to the basic concepts, theory and procedures for analyzing and designing various bridges' elements based on several code of practice such as British Standard, and Eurocodes. This syllabus covers topics on introduction to basic function, types and arrangement of bridges, general types of bridge loadings, effects temperature and shrinkage, bridge deck analysis, design of substructure. Furthermore, the students will be exposed to design concepts and construction of prestressed concrete bridge, long span bridges (suspension bridges and cable-stayed bridges) and also other two types of bridges military; portable bridges and floating bridges. Besides, students also have to work in group and are required to conduct a mini design project, where they are asked to analyse, and design a given structures using computer software.

#### **Course Learning Outcomes**

At the end of this course students are able to:

- 1. Define and describe the function, types and basic arrangement of bridges, general types of bridge loadings and effects temperature and shrinkage.
- 2. Identify, calculate and analyse the applied loads on bridge deck based on two code of practice which is British Standard, and Eurocodes. Also, analyse, and design bridge substructure such as abutment and pier.
- 3. Explain design concepts and construction of prestressed concrete bridge, long span bridges (suspension bridges and cable-stayed bridges) and also other two bridges military; portable bridges and floating bridges.
- 4. Work in a team, seeking contemporary knowledge to prepare bridge design report, drawing plan and bridge element detailing, professionally and ethically, and to present it with standard communication skill.

- 1. M Imran Rafiq (2009). Bridge Deck Loading and Analysis. University of Surrey, UK.
- 2. M Imran Rafiq (2009). Prestressed Concrete Bridge Design. University of Surrey, UK.
- 3. Ryall, M.J.; Parke, G.A.R. & Harding, J.E. (2001). Manual of Bridge Engineering, Published by Thomas Telford, UK.
- 4. BS 5400-1:1988. Steel, concrete and composite bridges Part 1: General statement. London: BSi.



## MECHANICAL ENGINEERING DEPARTMENT

#### MECHANICAL ENGINEERING DEPARTMENT

#### Professor

Dr. Aidy bin Ali, MESIS, MISDS, MPIK, MSAMPE B.Eng (Hons) (Mechanical) (UPM), M.Eng (UKM), PhD (Sheffield)

Dr. Risby Mohd Sohaimi, C.Eng, MIMechE B.Eng (Hons) (Civil) (USM), M.Sc (UPM), PhD (UPM)

Dr. Megat Mohamad Hamdan bin Megat Ahmad B.Eng (Hons) (Agriculture) (UPM), M.Sc (Birmingham), PhD (Wales)

#### **Associate Professor**

Dr. Dian Darina Indah binti Hj. Daruis B.Eng (Hons) (CAD/CAM) (UM), M.Sc (Manufacturing System Engineering) (Warwick), PhD (UKM)

Ir. Dr. Mohd Zaid Othman, P.Eng B.Eng (Hons) (Mechanical) (Liverpool), M.Sc (Liverpool), PhD (UMIST)

Dr. Leong Kin Yuen, C.Eng, MIMechE Dip Mechanical with Education (ITTHO/UTM), B.Eng (Hons) (Mechanical) (KUITTHO), M.Eng (UM), PhD (UM)

Lt Kol Dr. Khairul Hasni bin Kamarudin (Bersara) B.Eng (Mechanical) (Australia), M.Soc Sc (UKM), M.Sc (IT) (UKM), PhD (UPNM)

Mej Ir. Dr. Razali bin Abidin (Bersara) Dip (Mechanical) (UTM), B.Eng (Hons) (Mechanical) (UTM), M.Eng (UTM), PhD (UKM)

Dr. Khisbullah Hudha B.Eng (Mechanical) (Institut Teknologi Bandung), M.Sc (Utrecht Polytechnic the Netherlands/Wolverhampton University), PhD (UTM)

Ir. Dr. Saiddi Ali Firdaus bin Mohamed Ishak, P.Eng, MIEM, MIOA B.Eng (Mechanical-Aeronautics) (UTM), M.Eng (Mechanical) (UTM), PhD (Loughborough)

Ir. Dr. Mohd Rosdzimin bin Abdul Rahman, P.Eng, MIEM B.Eng (Hons)(Mechanical) (UTM), M.Eng (Mechanical) (UTM), PhD (Keio, Japan)

#### Senior Lecturer

Dr. Ku Zarina binti Ku Ahmad B.Eng (Hons) (Material Eng) (USM), M.Sc (USM), PhD (UKM) Dr. Tan Kean Sheng\* B.Eng (Hons) (Mechanical) (UPM), M.Sc (UPM), PhD (UPM)

Dr. Raja Nor Izawati binti Raja Othman B.Sc (Chemical Eng) (Syracuse), M.Sc (UPM), PhD (Manchester)

Ir. Ts. Dr. Mohd Rashdan bin Saad, P.Eng, MIEM, MRAeS, MIET, Mbr. AIAA, AAE *M.Eng (Aerospace)(Manchester), PhD (Manchester)* 

Ir. Dr. Abd. Rahim bin Mat Sarip, P.Eng B.Eng (Mechanical-Aeronautics) (UTM), M.Eng (Mechanical) (UTM), PhD (UTM)

Ir. Dr. Balamurugan a/I Annamalai Gurunathan, P.Eng, C.Eng, AAE, MIEM, MIMechE B.Eng (Hons) (Mechanical) (UTM), M.Eng (Mechanical) (UTM), PhD (Imperial College)

Dr. Mohamad Faizal bin Abdullah B.Eng (Hons) (Mechanical) (UKM), M.Sc (UKM), PhD (UKM)

Dr. Zulkiffli bin Abd. Kadir B.Eng (Mechanical-Automotive)(UTeM), M.Sc (UTeM), PhD (UTM)

Dr. Norwazan binti Abd Rahim\* B.Eng (Hons) (Mechanical) (UPM), M.Sc (Mech.Eng) (UPM), PhD (UTM)

Dr. Noor Hafizah binti Amer M.Eng (Mechanical-Automotive)(Nottingham), MEngSc (UM), PhD (UTM)

#### Lecturer

Mohd Fazli bin Mohd Yusoff B.Eng (Hons) (Mechatronic) (UIAM), M.Eng (ANU)

Syafawati binti Hasbi M.Eng (Mechanical) (Sheffield), MEngSc (UM)

Nur Akmal binti Haniffah B.Sc (Engineering) (Ibaraki), M.Eng (Ibaraki)

Mohd Khairul Faidzi bin Muhamad Paudzi \* B.Eng (Hons) (Mechanical) (UPNM), M.Sc (Manchester)

\*Cuti belajar/sabatikal

#### PROGRAM COURSE STRUCTURE AND TOTAL CREDIT REQUIREMENT BACHELOR OF MECHANICAL ENGINEERING (ZK08)

Total credit required for graduation is listed in table below. The duration of study to be completed is long 8 semesters and 1 short semester. Courses need to be taken are described in the following section.

COURSE	CREDIT
University Courses: i. University Core ii. University Elective	24 6
Program Core Courses: i. Program Core ii. Faculty Core	81 20
Program Elective Course (Technical Specialization)	9
TOTAL CREDIT FOR GRADUATION	140

## PROGRAM CORE COURSES

CODE	COURSE	CREDIT	PRE-	PRE-
			REQUISITE	STATUS
EMM 3313	Engineering Mechanics (Statics)	3		
EMM 3323	Dynamics	3	EMM 3313	MP
EMM 3463	Materials Engineering	3		
EMM 3423	Strength of Materials I	3	EMM 3313	MP
EMM 3433	Strength of Materials II	3	EMM 3423	MP
EMM 3533	Mechanics of Machines	3	EMM 3323	MP
EMM 3543	Vibration	3	EMM 3323	MT
EMM 3443	Thermodynamics I	3		
EMM 3513	Thermodynamics II	3	EMM 3443	MP
EMM 3593	Heat Transfer	3	EMM 3513	MT
EMM 3453	Fluid Mechanics I	3		
EMM 3523	Fluid Mechanics II	3	EMM 3453	MP
EMM 3623	Computer Aided Engineering (CAE)	3		
EEE 3352	Introduction to Electrical Engineering	2		
EEE 3362	Electronics	2		
EMM 3552	Instrumentation	2		
			EMM 3323	MT
EMM 3563	Control Engineering	3	EEE 3362	MT
			EFA 3213	MT
EMM 3333	Mechanical Engineering Drawing	3		
EMM 3573	Mechanical Engineering Design	3	EMM 3433	MT
			EMM 3533	MT
EML 3512	Mechanical Engineering Laboratories	2		
EML 3522	Advanced Mechanical Engineering Laboratories	2	EML 3512	MT
EMM 3633	Capstone Project	3	EMM 3573	MT
EMM 3341	Workshop Practice	1		
EMM 3583	Manufacturing Technology	3		
EMM 3594	Industrial Training	4		
EMM 3642	Engineering Management	2		
EMM 3652	Engineers in Society	2		
EMM 3662	Operations Management	2		
			EMM 3433	MT
			EMM 3513	MT
EMT 3612	Final Year Project I	2	EMM 3523	MT
			EMM 3533	MT
			EMM 3573	MT
EMT 3624	Final Year Project II	4	EMT 3612	MP

### PROGRAM ELECTIVE COURSES (TECHNICAL SPECIALIZATION)

CODE	COURSE	CREDIT
EME 3713	Composite Materials	3
EME 3723	System, Structure and Dynamics of Ground Vehicles	3
EME 3733	Turbomachinery	3
EME 3743	Non-Destructive Testing	3
EME 3753	Air-Conditioning & Refrigeration	3
EME 3763	Energy Efficient Buildings	3
EME 3773	Aerodynamics	3
EME 3783	Combustion	3
EME 3793	Turbocharging	3
EME 3803	Machine Learning and Artificial Intelligence	3

#### PROGRAM CURRICULUM STRUCTURE BACHELOR OF MECHANICAL ENGINEERING (ZK08)

	FIRST YEAR						
SEMESTER 1					SEMESTER 2		
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
	-		University C	Core Cou	rses		
DUS 3012	Military History	2	-	MPU 3132	Appreciation of Ethics and Civilisation	2	-
MPU 3142	Philosophy and Current Issues	2	-	DUM 3022	Military Leadership	2	-
LLE 3012	English for Academic Writing	2	-				
			University Ele	ective Co	urses		
PLS 3111	PALAPES **	1**	-	QKX 3XX2 / ALK 3112 / PLS 3121	Co-Curriculum / General Military Training 1* / PALAPES **	2 / 2* / 1**	-
	-		Faculty Co	ore Cours	es		
EFA 3253	Engineering Mathematics I (Calculus III)	3	-	EFA 3213	Engineering Mathematics II (Differential Equation)	3	-
EFB 3212	Introduction to Engineering	2	-				
			Program C	ore Cour	ses		
EEE 3352	Introduction to Electrical Engineering	2	-	EEE 3362	Electronics	2	-
EMM 3341	Workshop Practice	1	-	EMM 3333	Mechanical Engineering Drawing	3	-
EMM 3313	Engineering Mechanics (Statics)	3	-	EMM 3323	Dynamics	3	⁺EMM 3313
٦	TOTAL	17/17*/1 8**		TOTAL 17/17*/1 6**			

Civillian Student

\* Cadet Officers

\*\* PALAPES

+ Must pass

# Must taken

	SECOND YEAR						
SEMESTER 3			SEMESTER 4				
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
	University Core Courses						
DUS 3022	Introduction to Strategic Studies	2	-	MPU 3312	Nationhood in World Politics	2	-
				LLE 3032	Al-Ghazali's Dialogue: English Communication	2	-
	1	1	University Elec	tive Cou	rses	1	L
QKX 3XX2 / ALK 3122 / PLS 3131	Co-Curriculum / General Military Training 2 * / PALAPES **	2 / 2* / 1**	-	QKS 3172/ PLS 3141	Unarmed Combat*/ PALAPES **	2*/1**	-
	]	1	Faculty Core	e Course	S	I	L
EFA 3233	Engineering Mathematics III (Complex Variable and Vector)	3	-	EFA 3223	Engineering Mathematics IV (Statistics)	3	-
EFC 3223	Computing I (C and C++)	3	-	EFC 3213	Computing II (Numerical Methods and Engineering Software)	3	-
Program Core Courses							
EMM 3423	Strength of Materials I	3	<sup>+</sup> EMM 3313	EMM 3433	Strength of Materials II	3	⁺EMM 3423
EMM 3443	Thermodynamics I	3	-	EMM 3453	Fluid Mechanics I	3	-
EMM 3463	Materials Engineering	3	-				
	TOTAL	19/19*/1 8**			TOTAL	16/18*/1 7**	

**Civillian Student** 

\* Cadet Officers

\*\* PALAPES

+ Must pass

# Must taken



THIRD YEAR							
SEMESTER 5					SEMES	STER 6	
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
	University Core Courses						
LLF 3XX1	Foreign Language I	1	-	LLF 3XX1	Foreign Language II	1	-
LLA 3XX1	Foreign Language I	Audit	-	LLA 3XX1	Foreign Language II	Audit	-
MPU 3412 or MPU 3422	Human Movement Science or Community Service	2	-				
	1	ι	Jniversity Elect	ive Cours	es	1	1
QKX 3XX2 / PLS 3151	Co-Curriculum / PALAPES **	2/1**	-	PLS 3161	PALAPES **	1**	-
	1		Program Core	e Courses	5	1	1
EML 3512	Mechanical Engineering Laboratories	2	-	EML 3522	Advanced Mechanical Engineering Laboratories	2	<sup>#</sup> EML 3512
EMM 3583	Manufacturing Technology	3	-	EMM 3573	Mechanical Engineering Design	3	#EMM 3433 #EMM 3533
EMM 3513	Thermodynamics II	3	⁺EMM 3443	EMM 3593	Heat Transfer	3	<sup>#</sup> EMM 3513
EMM 3523	Fluid Mechanics II	3	⁺EMM 3453	EMM 3563	Control Engineering	3	#EMM 3323 #EEE 3362 #EFA 3213
EMM 3533	Mechanics of Machines	3	<sup>+</sup> EMM 3323	EMM 3543	Vibration	3	#EMM 3323
				EMM 3552	Instrumentation	2	-
	TOTAL	19/17*/1 8**			TOTAL	17/17*/1 8**	



- \* Cadet Officers\*\* PALAPES + Must Pass
- # Must Taken

THIRD YEAR				
INTER – SESSION				
CODE	COURSE	CREDIT	PRE-REQUISITE	
EMM	Inductrial Training	Λ	Passad 60 gradit bours	
3594	industrial fraining	4	Fassed of credit nours	
TOTAL		4		

	FOURTH YEAR						
SEMESTER 7				SEMES	TER 8		
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
			University Co	ore Cours	ses		
DUS 3032	Military Law and Laws of Armed Conflict	2	-	MPU 3212	Basic Entrepreneurship	2	-
	¬		Program Co	re Cours	es		
EMT 3612	Final Year Project I	2	#EMM 3433 #EMM 3513 #EMM 3523 #EMM 3533 #EMM 3573	EMT 3624	Final Year Project II	4	<sup>+</sup> EMT 3612
EMM 3633	Capstone Project	3	⁺EMM 3573	EMM 3652	Engineers in Society	2	-
EMM 3662	Operations Management	2	-	EMM 3642	Engineering Management	2	-
EMM 3623	Computer Aided Engineering	3	-				
Program Elective Courses							
EME 3XX3	Elective I	3	-	EME 3XX3	Elective II	3	-
				EME 3XX3	Elective III	3	-
	TOTAL	15			TOTAL	16	

**Civillian Student** 

- \* Cadet Officers
- \*\* PALAPES
- ⁺ Must pass
- # Must taken

#### SYNOPSIS OF CORE COURSES PROGRAM BACHELOR OF MECHANICAL ENGINEERING PROGRAM (ZK08)

COURSE CODE	: EMM 3313
COURSE NAME	: ENGINEERING MECHANICS (STATICS)
	MEKANIK KEJURUTERAAN (STATIK)

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

Statics is the study of methods for quantifying the forces between bodies. This course introduces the concepts of engineering based on forces in equilibrium and the importance of free body diagram in analysis of forces on simple objects, structures joined by engineering connections, basic machines, frames and trusses, friction, centre of gravity on rigid body and moment of inertia. Newtonian method is used to find solution for equilibrium of particles and rigid body with an applications of algebra, trigonometry and many key physics concepts. Students will undergo selected laboratory experiments to strengthened understanding on basic mechanics. The course will promote conceptual understanding and problem solving skills of basic engineering mechanics problems.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Describe basic principles and theories related to statics based on 2-D and 3-D force system in equilibrium.
- 2. Solve problems on statics based on 2-D and 3-D force system including center of gravity using principle of equilibrium of rigid bodies.
- 3. Analyze simple engineering problems related to 2-D and 3-D force system.
- 4. Analyze the mechanics of rigid bodies in statics experimentally.
- 5. Function effectively as individual and as team member in conducting experimental work.

#### Reference

1. Hibbeler R.C, Engineering Mechanics Statics, 14<sup>th</sup> Edition in SI Units, Pearson, 2016.



COURSE CODE	: EMM 3323
COURSE NAME	: DYNAMICS
	DINAMIK

3 Credit HoursPre-requisite: Engineering Mechanics (Statics) EMM 3313

#### **Course Synopsis**

This course is a continuation of EMM 3313. It deals with further topics in the field of Engineering Mechanics, covering the broad subfield of Dynamics. The course covers the principles of kinematics and kinetics of particles and rigid bodies in planar motion. Students are required to undergo selected laboratory experiments related to the course.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Analyze the displacement, velocity and acceleration of moving particles and rigid bodies using kinematics method.
- 2. Analyze the kinetics of particle and rigid body motion using Newton's Law of motion, Work-Energy and Impulse-Momentum principle as well as concept of mass moment of inertia.
- 3. Analyze kinetics of rigid bodies experimentally.
- 4. Function effectively as individual and as team member in conducting experimental work.

#### Reference

1. Hibbeler R.C, 2016. Engineering Mechanics Dynamics SI 14<sup>th</sup> Edition, Pearson Prentice-Hall, Inc.



#### COURSE CODE : EMM 3463 COURSE NAME : MATERIALS ENGINEERING **KEJURUTERAAN BAHAN**

**3 Credit Hours** Pre-requisite : None

#### **Course Synopsis**

This subject introduces the basic principles of materials engineering covers introduction to engineering materials, interatomic bonding, crystalline structure, phase diagrams stressing the relationship between internal structures to mechanical properties, material processing on properties and the selection of materials for design Explanation on different types of engineering material, its mechanical properties, basic applications and processing are also included.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain individual atom as well as inter-atomic bonding, crystal structure of solids, phase transformation and interpret phase diagram.
- 2. Explain the characteristics, structure, properties and processing of metal, ceramic, polymer and composite materials.
- 3. Apply properties of engineering materials to select and specify suitable materials to meet specific application.
- 4. Analyze materials properties experimentally.
- 5. Function effectively as individual and as team member in conducting experimental work.

- Shakelford, J.F., 2016, Introduction to Materials Science for Engineers, 8th Ed., 1. Pearson.
- 2. Callister, W.D., 2015, Materials Science and Engineering, 9th Ed., John Wiley & Sons.

#### COURSE CODE : EMM 3423 COURSE NAME : STRENGTH OF MATERIALS 1 KEKUATAN BAHAN 1

3 Credit HoursPre-requisite: Engineering Mechanics (Statics) EMM 3313

#### Course Synopsis

This course will provide students with the knowledge on material strength based on the study of mechanics on stress, strain, torsion and bending and its effects on rigid bodies. Among rigid body structures that will be emphasized in this course are shaft, bar, pin, bolt, beam and etc. The study of various types of loadings such as to axial loadings, transverse loadings and torsions which will cause deformations in rigid bodies. The study will only cover the effect of various loads on rigid bodies within its elastic limit. At the end of the course, students should be able to calculate the stress, strain and the deformation of structures caused by the different types of loading conditions. Students should also be able to solve limited complex problems related to statically determinate and indeterminate structures.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Describe basic principles and theories related to stresses, strains and deformation of structures caused by various types of loading such as axial load, transverse load and torsional load.
- 2. Solve problems on stresses, strains and deformation of structures caused by various types of loading such as axial load, transverse load and torsional load.
- 3. Analyze engineering problems related to stresses, strains and deformation of structures caused by various types of loading such as axial load, transverse load and torsional load.
- 4. Analyze the mechanics of stress, strain and bending of structures experimentally.
- 5. Function effectively as individual and as team member I conducting experimental work.

- 1. Hibbeler R.C., Mechanics of Materials, 10<sup>th</sup> Ed., Pearson, 2017.
- 2. Beer, F.P., Johnston, E.R. and DeWolf, J.T., Mechanics of Materials, 5<sup>th</sup> Edition, Singapore: McGraw-Hill Higher Education.

#### COURSE CODE : EMM 3433 COURSE NAME : STRENGTH OF MATERIALS II KEKUATAN BAHAN II

 3 Credit Hours

 Pre-requisite
 : Strength of Material I EMM 3423

#### **Course Synopsis**

The course is an extension to EMM 3423, which is the pre-requisite to this course. It aims to extend the student's knowledge and understanding of the behavior of materials and structures under a variety of loading conditions. It will examine 2D and 3D stress and strain, multi-axial elastic constitutive relations, failure criteria and thick and thin cylindrical structures. The course will also provide an opportunity to investigate structural behaviors such as determinate and indeterminate analyses for displacement by using the energy method. At the end of the course, students should be able to solve problems in plane stress, plane strain, torsion and bending. Besides, they should be able to determine the stresses, strains and displacements of structures. The aspect of designing safe components and structures shall also be emphasized to the students.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Describe/derive the principles/theories in relation to stresses, strains of structures.
- 2. Analyse and solve problems on stresses and strains of structures under various types of loading.
- 3. Design simple structures for complex stresses and strains conditions.

- 1. Beer, F.P., Johnston, E.R. and DeWolf, J.T., Mechanics of Materials, 11<sup>th</sup> Edition, McGraw-Hill Higher Education, 2016.
- Gere, J.M. and Goodno, B.J., Mechanics of Materials, 9<sup>th</sup> edition, Cengage Learning, 2016
- 3. Hibbeler, R.C. Mechanics of Material, 12<sup>th</sup> Edition, Singapore: Prentice Hall, 2016.



#### COURSE CODE : EMM 3533 COURSE NAME : MECHANICS OF MACHINES MEKANIK MESIN

3 Credit HoursPre-requisite: Dynamics EMM 3323

#### **Course Synopsis**

This course emphasizes the application of velocity diagram and acceleration diagram in analysing kinematics of linkage mechanism. Analytical approach is used to solve kinetics of planar mechanism problem. Application of principles of dynamics in analysis of gear system, belt drive, flywheel and balancing of masses are also explored. Extension of principles of dynamics to simple harmonic motion of single degree freedom is also presented.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Analyse the kinematic and kinetics on selected mechanism in machinery.
- 2. Evaluate kinematics and kinetics in machinery using suitable engineering tools.

- 1. Mahmoud A. Mostafa. Mechanics of Machinery. CRC Press, 2012.
- 2. William L. Cleghorn, Nikolai Dechev. Mechanics of Machines. Oxford University Press, 2015.
- 3. Ilie Talpasanu, Alexandru Talpasanu. Mechanics of Mechanisms and Machines. CRC Press, 2019.



COURSE CODE	: EMM 3543
COURSE NAME	: VIBRATION
	GETARAN

3 Credit HoursPre-requisite: Taken Dynamics EMM 3323

#### **Course Synopsis**

This subject introduces the concept of modeling and analysis of lumped parameter and simple distributed parameter system, stressing the importance of natural frequencies and mode shape. The control and suppression of vibrations and/or their effect for simple systems are also explored. It also covers experimental work in vibration testing and measurements.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Sketch a simplified model of vibratory system.
- 2. Formulate an analytical model for a simplified vibratory system.
- 3. Evaluate the model for the associated mode shapes.
- 4. Evaluate the techniques used in vibration control.
- 5. Perform vibration test and measurement.
- 6. Function effectively as individuals and as team member in conducting experimental work.

- 1. S.S. Rao, "Mechanical Vibration" SI Edition (2005), Prentice-Hall.
- 2. W T Thompson, Dahleh, "Theory of Vibration with Application" 5<sup>th</sup> Edition, Prentice Hall.

#### COURSE CODE : EMM 3443 COURSE NAME : THERMODYNAMICS I TERMODINAMIK I

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course begins with the identification of the unique vocabulary associated with thermodynamics through the precise definition of basic concepts to form a sound foundation for the development of the principles of thermodynamics. Students are introduced to the first law of thermodynamics, energy balances and mechanism of energy transfer to or from a system. Various forms of energy and energy transfer are considered which a general relation for the conservation of energy principle or energy balance is developed. Procedures for determining thermodynamics properties of pure substances from tables of property data are demonstrated. The general energy balance relation to closed systems is applied which extends the energy analysis to systems involving mass flow across their boundaries. Students are then introduced to the second law of thermodynamics and applied it to cycles, cyclic devices and processes, which lead to the definition of entropy.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain basic principles, definitions and theories of the laws of thermodynamics.
- 2. Apply the principle of thermodynamic in obtaining other thermodynamics properties.
- 3. Analyze engineering thermodynamics problems related to the laws of thermodynamics.
- 4. Analyze engineering thermodynamics experimentally.
- 5. Function effectively as individual and as team member in conducting experimental work.

- 1. Yunus A. Cengel and Michael A. Boles, 2019. Thermodynamics An Engineering Approach, 9<sup>th</sup> Edition in SI Units, McGraw-Hill.
- 2. Yunus A. Cengel and Michael A. Boles, 2015. Thermodynamics An Engineering Approach, 8<sup>th</sup> Edition in SI Units, McGraw-Hill.



3. T.D. Eastop & A. McConkey, Applied Thermodynamics for Engineering Technologists, 5<sup>th</sup> Edition: Pearson Education.

COURSE CODE	: EMM 3513
COURSE NAME	: THERMODYNAMICS II
	TERMODINAMIK II

3 Credit Hours Pre-requisite : Thermodynamics I EMM 3443

#### **Course Synopsis**

This course is designed to extend the student's understanding of the first and second law of thermodynamics. It illustrates the broad application of the theory to many engineering applications. It emphasizes the analysis of compression process, energy transfers during power generation, heating and refrigerating processes. At the end of the course, students should be able to apply the thermodynamic concepts and perform calculations to evaluate the performance of positive displacement machine, gas and vapor power cycles and the performance of refrigeration and heat pump cycles. The students should be able to perform a thermodynamic analysis of gas-vapor mixtures. The students should also be able to define, analyze and evaluate exergy engineering devices in light of the second law of thermodynamics.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain the thermodynamic engineering cycles.
- 2. Analyze the thermodynamic engineering cycles.
- 3. Evaluate thermodynamic engineering cycles.
- 4. Investigate the real situations of the thermodynamic engineering cycles.
- 5. Function effectively as individual and as team member in work team

- 1. Yunus A.Cengel, Michael A.Boles and Mehmet Kanoglu, 2019. Thermodynamics -An Engineering Approach, 9th Edition in SI Units, McGraw-Hill.
- 2. Moran, M.J. and Shapiro, H. N., 2004. Fundamentals of Engineering Thermodynamics, Fifth Edition. New Jersey: John Wiley & Sons
- 3. Eastop, T.D. and McConkey, A., Applied Thermodynamics for Engineering Technologists, Fifth Edition Pearson Education.



#### COURSE CODE : EMM 3593 **COURSE NAME** : HEAT TRANSFER PEMINDAHAN HABA

**3 Credit Hours** Pre-requisite : Taken Thermodynamics II EMM 3513

#### **Course Synopsis**

This course introduces the basic principle and fundamental of heat transfer. It covers various modes of heat transfer such as conduction, convection and radiation. Thermal analysis on extended surfaces (fins) and heat exchanger (LMTD and Effectiveness - NTU methods) are also included in this course.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain the concepts of heat transfer in engineering applications.
- 2. Analyze heat transfer related to engineering problems in conduction, convection and radiation.
- 3. Evaluate heat exchanger related to engineering applications.

- 1. Yunus A. Cengel and A. J. Ghajar, Heat and Mass Transfer, Fundamentals and Applications, 5<sup>th</sup> edition in SI Units. McGraw-Hill, Singapore, 2015.
- 2. F. P. Incropera, D.P. Dewitt. T.L.Bergman, A.S. Lavine, Principles of Heat and Mass Transfer, John Wiley & Sons; 7th edition, Singapore, 2013.



#### COURSE CODE : EMM 3453 COURSE NAME : FLUID MECHANICS I MEKANIK BENDALIR I

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course will provide students with an understanding of the fluid properties, an introduction to fundamental laws and description of fluid behaviour either in static and dynamic. It will emphasize on the concept of gauge and absolute pressure and calculating of a hydrostatic force due to immersed of flat and curved surfaces, floatation and buoyancy analysis. Flow and pressure measurements by using fluid manometer. Derivation and application of a continuity, momentum, and energy equations such as Euler and Bernoulli in the flow problems. Friction due to flow in pipe for turbulent and laminar conditions. Dimensional analysis and similarities will be introduced at the end of the course. At the end of the course, the student should be able to demonstrate an ability to analyse whether statically, dynamically or kinematically problems related directly to fluids.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain basic principles, definitions and theories in all topics as given in the lecture contents and syllabus.
- 2. Apply the principle of fluid mechanics in solving related problems.
- 3. Analyze fluid mechanics problems in related topics.
- 4. Analyze fluid mechanics problems experimentally.
- 5. Function effectively as individual and as team member in conducting experimental work.

#### Reference

1. Yunus A. Chengel. & J. M. Cimbala, Fluid Mechanics Fundamental and Applications, McGraw Hill International Edition, 4<sup>rd</sup> Edition in SI Units, 2018.

#### COURSE CODE : EMM 3523 COURSE NAME : FLUID MECHANICS II MEKANIK BENDALIR II

3 Credit HoursPre-requisite: Fluid Mechanics I EMM 3453

#### Course Synopsis

This course will further enhance the basic fluid mechanics knowledge and application to the real engineering fluid problems. Importance of ideal fluid flow in fluid modeling and analysis of boundary layer flow in engineering problems are among the main topics in this course. Besides that, a flow analysis and basic design of hydraulic turbo machine such as centrifugal pump and turbine are also discussed. Finally, the introduction to compressible flow was introduced. However, the course will cover up to an isentropic flow problem only.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Apply the principles and theories in Boundary Layers and Ideal flow, Compressible Flow, Pumps and Turbines.
- 2. Analyze the problems related to Boundary Layers, Ideal flow, Compressible Flow, Pumps and Turbines.
- 3. Investigate real engineering problems related to pumps and turbines selection.
- 4. Communicate the findings in real engineering problem investigations related to pumps and turbines.

- 1. Yunus A. Chengel. & J.M. Cimbala, Fluid Mechanics Fundamental and Applications, McGraw Hill International Edition, 4<sup>rd</sup> Edition in SI Units, 2018.
- 2. Fluid Mechanics II note by W.A.Wan Mat, 2017.

#### COURSE CODE : EMM 3623 COURSE NAME : COMPUTER AIDED ENGINEERING KEJURUTERAAN BERBANTUKAN KOMPUTER

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course presents the fundamental concepts and techniques for the application of computer–aided engineering tools in solving basic engineering problems. The methods learned in this course can be applied to almost any engineering field, or form a basis for further research and study in computer-aided engineering field. This course includes theoretical and practical components and is intended to provide the student with a good foundation of CAE techniques in Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD). Upon completion of the course, (1) students will have the basic theory of FEA and CFD and (2) hands-on experience to design and perform simulation analysis using commercial FEA/CFD software packages to solve engineering problems.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Formulate the basic equations of finite element method and finite volume method for simple one- and two-dimensional element models.
- 2. Apply the basic finite element analysis and computational fluid mechanics to model and analyze simple real engineering problems, by hand calculation, and then interpret the results.
- 3. Make use of available finite element and computational fluid dynamics software to solve real-life engineering problems, especially those of the structural mechanics type, and correctly interpret the results obtained.

- 1. Dante, A.W., "Introduction to Computational Fluid Dynamics", Cambridge University Press, 2012.
- 2. Chandrupatla T.R and Belegundu A.D, Introduction to Finite Elements in Engineering, 4<sup>th</sup> edition, Prentice Hall Inc., 2011.



3. Saeed Moaveni, Finite Element Analysis: Theory and Applications with ANSYS, 4<sup>th</sup> Ed., ISBN Prentice Hall, 2015.

#### COURSE CODE : EEE 3352 COURSE NAME : INTRODUCTION TO ELECTRICAL ENGINEERING PENGENALAN KEPADA KEJURUTERAAN ELEKTRIK

2 Credit Hours Pre-Requisite : None

#### **Course Synopsis**

This is an introduction course for students who are not majoring in electrical and electronics engineering. It mostly covers the basics of circuit theories, the application aspects of transformers and electric machineries. In the circuit theory part, various analysis methods like, Ohm's Law, Kirchhoff's Law, Thevenin's Theorem, Norton's Theorem, etc will be taught. Inductive and capacitive elements would also be included. Some theory on magnetic circuit and transformer functionality will also be given. For the introductory material on electric machinery, the students will be taught about magnetic circuits, AC and DC motors and generators and various aspects of energy conversion involving the devices.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Understand the basic theories of electric and magnetic circuits, and electric machines.
- 2. Apply the above concepts to solve problems on the electric and magnetic circuits, and electric machines.
- 3. Analyze the circuits involving electric and magnetic circuits, and electric machines.

- 1. Giorgio Rizzoni, "Fundamentals of Electrical Engineering", McGraw Hill, 2009.
- 2. Alexander and Sadiku, Fundamentals of Electric Circuits, 6<sup>th</sup> ed. McGraw Hill, 2016.
- 3. Thomas L. Floyd, "Electronic Devices", 9<sup>th</sup> Edition, Pearson Education 2012.

COURSE CODE	: EEE 3362
COURSE NAME	: ELECTRONICS
	ELEKTRONIK

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This is an introduction of Electronics field to Mechanical Engineering based programs. It covers the fundamental and basic topics in both analog and digital electronics combined, with emphasis towards the applications. This course is divided into 3 parts; namely analogue electronics, digital electronics and microcontrollers. In analogue electronics, it covers the fundamental properties of operational amplifier along with its characteristics and applications. In digital electronics, it covers on the digital devices, its essential features of digital logic circuits and systems used in applications. Overall, this course is devoted to an overview of the basic functions of microcontroller, including the architectures, applications and assembly language.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Understand the fundamental properties of analog and digital circuits, and microcontroller.
- 2. Apply the above concepts to solve problems involving analog and digital circuits, and microcontroller.
- 3. Analyze the circuits of analog and digital circuits, and microcontroller.

- 1. Giorgio Rizzoni, Principles and Applications of Electrical Engineering, 6<sup>th</sup> Edition, McGraw Hill 2015.
- 2. Thomas. L. Floyd, Electronic Devices, 9<sup>th</sup> Edition, Pearson Education 2012.

COURSE CODE	: EMM 3552
COURSE NAME	: INSTRUMENTATION
	INSTRUMENTASI

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

The course shall cover the essentials and basic theory of instrumentation for undergraduate students. It will emphasize on the concepts, principles and characteristics of instrumentation system signal conditioning, transducers and application of strain gauges in load measurements. At the end of the course, students should be able to acquire knowledge on the fundamentals of an instrumentation system, relate and describe the operating principle and application of various transducers that are typically used in industry, design instrumentation system for measuring load, displacement, temperature and other physical quantities, select suitable instrumentation components and tools for intended application and solve problems related to basic instrumentation system.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Describe the basic principles of an instrumentation system.
- 2. Relate the operating principle and application of various transducers with suitable signal conditioning system.
- 3. Solve and analyze problems related to an instrumentation system.
- 4. Develop an instrumentation system for measuring load, displacement, temperature and other physical quantities.
- 5. Function effectively as individual and as team member in conducting experimental work.
- 6. Develop a simple instrumentation system for a transducer using electric and electronics equipments.

- 1. C. D. Johnson, Process Control Instrumentation Technology, 8<sup>th</sup> edition, Pearson, 2014.
- 2. Northrop, Robert B. Introduction to Instrumentation and Measurement. CRC Press, 2018.

- 3. Anthony J.Wheeler & Ahmad R Ghanji, Introduction to Engineering Experimentation, 3<sup>rd</sup> edition, Pearson, 2010.
- 4. D.G. Alciatore & M. B. Histand, Introduction to Mechatronics and Measurement Systems, 5<sup>th</sup> edition, McGraw-Hill, 2018.

COURSE CODE	: EMM 3563
COURSE NAME	: CONTROL ENGINEERING
	KEJURUTERAAN KAWALAN

3 Credit Hours	
Pre-requisite	: Taken Dynamics EMM 3323, Electronics EEE 3362,
	Engineering Mathematics II EFA 3213

#### Course Synopsis

This course is designed to enable the students to acquire the essential and basic theory of control engineering for open and closed loop system. The topics covered would be mathematical modeling of dynamic systems, transfer function, time response analysis, stability criteria, root locus and frequency response methods. The course will also provide students with an exposure to basic control system design. Engineering tool for control simulation (Matlab - Simulink) will be introduced in this course.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Describe the basic principles and main components of control system.
- 2. Build the mathematical model, block diagram, signal flow graph and its equivalence transfer function for a given control system.
- 3. Analyze the time responses and the stability of control system.
- 4. Design a simple control system according to the required specifications.
- 5. Develop a simple plant model or control system using Matlab-Simulink.

- 1. Hishamuddin Jamaluddin, Mohd ShafiekYaacob and Robiah Ahmad, Introduction to Control Engineering, 1<sup>st</sup> Edition, UTM Press, 2011.
- 2. N.S. Nise, Control System Engineering, 8<sup>th</sup> edition, JohnWiley & Sons,Inc. 2019.
- 3. K.Ogata, Modern Control Engineering, 5<sup>th</sup> Ed. Prentice Hall, 2010.

#### COURSE CODE : EMM 3333 COURSE NAME : MECHANICAL ENGINEERING DRAWING LUKISAN KEJURUTERAAN MEKANIKAL

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course provides students with the knowledge on standard engineering drawing techniques. It consists of two main parts: conventional practices and computer aided design (CAD) approach. The topics covered are code and engineering standards, sketching and text, mechanical engineering geometry, orthographic, isometric, oblique, and sectional and assembly drawings, threads, fasteners and springs and geometry dimensioning and tolerance. With these knowledge, students are able to produce a standard and well-defined mechanical engineering drawing using not only the conventional practices but also in the CAD environment.

#### **Course outcomes**

At the end of the course students should be able to:

- 1. To apply fundamentals and conventional practices in creating mechanical engineering drawing.
- 2. To apply CAD system in creating mechanical engineering drawing.
- 3. To create a standard and well-defined mechanical engineering drawing.

- 1. Goetsch, D.L., Chalk, W.S, Nelson, J.A. & Rickman R.L, Technical Drawing and Engineering Communication, 7<sup>th</sup> Ed. Delmar Cengage Learning, 2016.
- Alejandro Reyes, 2019, Beginner's Guide to Solidworkds 2019 Lebal 1, 1<sup>st</sup> edition, SDC Publications

COURSE CODE COURSE NAME	: EMM 3573 : MECHANICAL ENGINEERING DESIGN REKABENTUK KEJURUTERAAN MEKANIKAL
3 Credit Hours	
Pre-requisite	: Taken Strength of Materials II EMM 3433 and

Mechanics of Machines EMM 3533

#### **Course Synopsis**

This course is intended for students to embark on the introduction to mechanical design. The approach is by developing understanding of mechanical components design using the fundamental applications of statics, mechanics of materials, material science, and failure criterion. Common components such as shafts, gears, bearings, bolts and mechanical joints are covered in detail. Computational tools for engineering are also applied. The course covers three main parts: the basic of machine design, failure prevention under static and variable loading and design process and analysis of common mechanical components.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Develop a mechanical system to fulfill design specification.
- 2. Apply failure criteria to select commercially available components and materials based on design requirements.
- 3. Utilise computer-aided engineering tools in design process.
- 4. Conduct project and perform tasks individually and in a team.

- 1. Budynas, R.G. & Nisbett, J. K., Shigley's Mechanical Engineering Design, 11<sup>th</sup>. Edition. McGraw-Hill, 2019.
- 2. Ugural, A.C., Mechanical Design of An Integrated Approach, International Edition, McGraw Hill, 2009.

# COURSE CODE: EML 3512COURSE NAME: MECHANICAL ENGINEERING LABORATORIESMAKMAL KEJURUTERAAN MEKANIKAL

2 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course enables students to have hands-on experience in conducting experimental works related to engineering theories learnt in the classes. The laboratory activities involved are divided to Thermodynamic, Fluids, Strength and Materials. Overall, students are required to complete all these activities with minimum supervision from the lecturers. The laboratory activity started with 1 hour lectures and followed by 2 hour laboratory work per week. The laboratory activities given to the students are based on open-ended concept. The lab manual/sheets given to the students comprise only the title, objective, background theories and type of apparatus/instruments used. With these limited information, they have to study and propose the relevant procedures to conduct the laboratory activities. Based on the given objectives, they also have to think of the types of output data, analysis, discussion and conclusion needed to accomplish the task.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Create relevant procedures and conduct the experiment.
- 2. Collect and analyse the data from the experiment.
- 3. Discuss and conclude finding.
- 4. Team work in conducting experiment and preparing technical report.

#### Reference

1. J.P. Hollman, Experimental Methods for Engineers 8<sup>th</sup> edition, McGraw-Hill, 2012.

(Refer to any subject course references related to experiments)
# COURSE CODE: EML 3522COURSE NAME: ADVANCED MECHANICAL ENGINEERING LABORATORIESMAKMAL KEJURUTERAAN MEKANIKAL LANJUTAN

2 Credit HoursPre-requisite: Taken Mechanical Engineering Laboratories EML 3512

# **Course Synopsis**

This is a hands-on subject for Mechanical Engineering students taken in the 3rd year of their program. In this course, students will be able to relate the theory and applications as much as possible when the experiments being handled by them. Using an open-ended approach, students are required to think critically and creatively in problem solving. There are 2 different modules in this course, short module and long module experiments. Students will be divided into small groups of around 5 people and each group will be assigned with 2 experiments from 2 short modules and 2 long modules. Therefore, each student in this course will be completing 4 experiments altogether. The durations for each short and long module experiment are 1 and 4 weeks respectively. Short module experiments are conducted based on the lab sheet to cover subjects that have not been covered in previous laboratory. For long module, students will only be given problem description as guideline. With this guideline, students are required to conduct their own experiment based on their engineering background. Report is expected from each of the students individually. The understanding of each student will be evaluated based on the presentation, log book and final report.

# **Course Outcomes**

At the end of this course students should be able to:

Short Module:

- 1. Create relevant procedures and conduct the experiment.
- 2. Collect and analyse the data from the experiment .
- 3. Discuss and conclude findings.
- 4. Team work in conducting experiment and preparing technical report.

Long Module:

- 1. Explain the theory in relation to the experiment and equipment used in addressing a given mechanical engineering problems within a given time frame.
- 2. Develop the appropriate objectives, experiments procedures, method and equipment.
- 3. Discuss, conclude findings and recommendation.
- 4. Team work in conducting experiment and preparing technical report.



1. Wheeler, A.J., Ganji, A.R., Introduction to Engineering Experimentation, 3<sup>rd</sup> Ed. Prentice Hall, 2009. (*Pefer to any subject course references related to experiments*)

(Refer to any subject course references related to experiments)

COURSE CODE	: EMM 3633
COURSE NAME	: CAPSTONE PROJECT
	PROJEK CAPSTONE

3 Credit Hours Pre-requisite : Mechanical Engineering Design EMM 3573

# Course Synopsis

Capstone project is a final year group project that emphasizes on systematic design. It intends to provide the senior engineering student with a realistic understanding of the design process and project management. It draws on a diverse set of inputs namely; decision making, engineering optimization, engineering economy, planning apart from combining the theory of science, engineering fundamental and mathematics, technologies and social aspects to produce a system. The design solution is suitable to overcome engineering problems through an approach of using creativity and innovative solutions. The students are expected to apply theories taught in the mechanical program in their project design solution. The subject provides an exposure to senior engineering students the appropriate approach and training in the undertaking of design processes and project management in a limited non-industry environment.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Analyze the various steps in a systematic design process.
- 2. Develop a mechanical system for given specifications.
- 3. Develop a proper solution to the design problem to fulfill the design specifications.
- 4. Design and evaluate a system using the engineering system design method.
- 5. Use modern tools as an aid to design and solve engineering problems.
- 6. Apply reasoning to knowledge that affects societal, health, safety, legal and cultural issues.
- 7. Demonstrate the understanding of engineering solutions in societal and environmental contexts.
- 8. Apply ethical principles.
- 9. Communicate effectively.
- 10. Conduct project and perform tasks individually and in a team.
- 11. Recognize and aware of the existing scientific literatures.
- 12. Plan and manage project.

#### References

1. David G. Ullman, The Mechanical Design Process, 6<sup>th</sup> Edition, McGraw Hill, 2017.



- 2. Dieter, G.E and Schmidt, L.G, Engineering Design A material and processing approach, 5th Edition, McGraw Hill, 2013.
- 3. Budynas, R.G and Nisbett, J.K. Shigley's Mechanical Engineering Design, 11th Ed. McGraw-Hill, 2019.

COURSE CODE	: EMM 3341
COURSE NAME	: WORKSHOP PRACTICE
	AMALI BENGKEL

1 Credit Hour Pre-requisite : None

# **Course Synopsis**

This course introduces students to the practical experience of workshop technology with a range of materials and processes. This course aims to provide an opportunity, through some structured practical training modules, for students to understand and appreciate the kind of practical skills required in normal engineering workshop practices involving the selection and operation of some commonly used workshop tools and machines. After the successful completion of the course, students are expected able to fabricate some engineering workpieces/product, by operating ordinary workshop machine tools such as lathe, milling machine, sheet metal forming and arc welding equipment. A strong emphasis will be made on the acquisition of safe workshop practices in workshop environment.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Acquire hand-on practical skills in turning and milling operations.
- 2. Acquire hand-on practical skills in sheet metal forming operation.
- 3. Acquire hand-on practical skills in arc welding operation.

- 1. Manufacturing Processes for Engineering Materials, 6<sup>th</sup> Ed., Kalpakjian Schmid. Pearson, 2016.
- 2. Materials and Process in Manufacturing, 10<sup>th</sup> Ed., Degarmo, Black and Kohser. John Wiley, 2007.

# COURSE CODE : EMM 3583 COURSE NAME : MANUFACTURING TECHNOLOGY TEKNOLOGI PEMBUATAN

3 Credit Hours Pre-requisite : None

# **Course Synopsis**

This subject provides students with knowledge on the fundamentals of various processes or production/ manufacturing techniques. It started from the overall introduction about manufacturing issues, followed by manufacturing topics such as new material processes, metal forming processes, non-traditional processes, computer aided manufacturing and quality control. Students are equipped with understanding of various types of processing with engineering materials; metallic and non-metallic. Knowledge is conveyed through classroom lecturing and laboratory or industrial visits. Continuous assessments are conducted through assignments, tests, quizzes and final exam. Students are expected to polish interpersonal and teamwork skill in solving manufacturing related problem through group projects.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain the various manufacturing processes.
- 2. Apply the manufacturing processes towards efficiency, competitiveness and current trend.
- 3. Analyze & compare the advantages & limitations of the selected manufacturing processes.
- 4. Plan the right processes based on product specification.
- 5. Demonstrate knowledge and understanding of engineering and management principles to project work.

- 1. Kalpakjian, S. et al., Manufacturing Engineering and Technology, 8<sup>th</sup> edition, Pearson, 2020.
- 2. Lefteri, C., Making it: Manufacturing techniques for product design, Laurence King Publishing, 2007.

COURSE CODE	: EMM 3594
COURSE NAME	: INDUSTRIAL TRAINING
	LATIHAN INDUSTRI

4 Credit Hours

Pre-requisite : Taken minimum 60 credits

#### **Course Synopsis**

Practical training is the platform for the students to get the opportunity to practice and apply the engineering knowledge and skills in various actual working environments. The ultimate goal is to give exposure, experience and professional skills to the students that will help in shaping them to become an effective and responsible military officer as required by the UPNM vision and mission. Students will undergo a practical training in the duration of 10 weeks at an approved private, government or semi-government agency. The faculty will release the list of participating agencies. Placement at the respective agencies will be initiated based on the applications by the students. Approval of the application is at the discretion of the department mainly based on the company nature of business and the type of exposure offered.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Present written report and presentation on the industrial training experience.
- 2. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- 3. Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
- 4. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
- 5. Apply reasoning informed by contextual knowledge to assess societal, and the consequent responsibilities relevant to professional engineering practice.
- 6. Understand the impact of professional engineering solutions in societal.

#### Reference

-Not applicable-

# COURSE CODE : EMM 3642 COURSE NAME : ENGINEERING MANAGEMENT PENGURUSAN KEJURUTERAAN

2 Credit Hours Pre-requisite : None

# **Course Synopsis**

The Engineering Management (EM) course is aimed at providing management theories that can be applied during an engineering profession upon the student's graduation. It is also to enable the students to "put on their management hat skill" in simulated engineering applications by exploring into real case studies on related management issues that are commonly faced. To obtain adequate significant, this course emphasizes the basic management functions, planning, organizing, leading and controlling in areas related to effective decision making. Projects tasks deliverables, responsibilities and timing requirement needed to manage project on time and within budget will be elaborated. The course will enable student to be equipped with real – life doses of management skills as the future practicing managers.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Apply knowledge and understand principles of EM in today's organization.
- 2. Analyze EM theories and tools on contemporary issues.
- 3. Apply the knowledge of EM in preparing case study
- 4. Presenting outcome based on the EM case study.
- 5. Evaluate the EM and finance case study

- 1. Chang, C.M, Engineering Management: Meeting the Global Challenges, 2<sup>nd</sup> Ed. CRC Press, 2016.
- 2. Chang, C.M, Engineering Management: Challenges in the New Millennium, Prentice Hall, 2005.
- 3. Lucy C. Morse and Daniel L. Babcock, Managing Engineering and Technology, 6<sup>th</sup> Edition, Pearson, 2013.

# COURSE CODE : EMM 3652 COURSE NAME : ENGINEERS IN SOCIETY JURUTERA KEMASYARAKATAN

2 Credit Hours

# **Course Synopsis**

All engineers do not work alone but they are part of society and they fulfill the needs of the society in many ways; as manager, as consultant/expert, as project/product designer, as academician, as legal enforcer etc. As a young engineer, knowledge of the economic, industrial and social contexts of engineering is on equal footing as the core engineering knowledge. Most of the time, engineers must be able to identify some of the non-technical decisions which do not relate to any engineering facts but instead have significant impact to society. To strengthen this requirement, an adequate knowledge on relevant aspects of engineering practice in society is vital for senior engineering student prior to their graduation as young engineers. In undertaking these tasks and roles, young engineers shall portray their professionalism to the society they are serving. Concepts of ethics, inclusive of engineer's code of ethic, sustainable development, related legal/ law requirement in implementing their responsibilities will be covered. Students will also be exposed to seminars delivered by invited professionals who will deliver talks on relevant and specific subjects of their professions.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Understand the role and responsibility as an engineer in the society.
- 2. Apply rules & regulation, codes, standards and acts & laws set by authorized bodies when working as an engineer.
- 3. Solving the important issue related to safety & Health and sustainability.
- 4. Investigate real case engineering problems and evaluate the outcomes.
- 5. Function effectively as an individual, and /or as a member or leader in investigation of engineering cases to evaluate the solution.
- 6. Recognize the need for, and have the preparation and ability to engaged investigation of engineering cases to evaluate the solution.

- 1. Engineers in Society, Arazi et al, McGrawHill (Malaysia), 2010.
- 2. Occupational Safety and Health Management, Ahmad Azan, Ungku Azly, UPNM Press, 2016
- 3. Engineering Professionalism and Ethics 4<sup>th</sup> Edition, The Institution of Engineers, Malaysia(IEM).



- 4. Engineering Ethics 4<sup>th</sup> edition, Charles B. Fledderman, Pearson Prentice Hall, 2012.
- 5. Factories and Machinery Acts with Regulation, MCD Publisher Sdn. Bhd. 1997.
- 6. Occupational Safety and Health Act 1994.
- 7. Factories and Machinery Acts 1967.
- 8. IEM Constitution & IEM By Laws.

COURSE CODE	: EMM 3662
COURSE NAME	: OPERATIONS MANAGEMENT
	PENGURUSAN OPERASI

one

2 Credi	t Hours		
Pre-rec	uisite	:	N

# **Course Synopsis**

The Operations Management (OM) Course presents an overview of management that deals with the design and management of products, processes, services and supply chains. It considers the acquisition, development, and utilization of resources that firms need to deliver the goods and services their clients want. The OM ranges from strategic to tactical and operational levels. Representative strategic issues include determining the size and location of manufacturing plants, deciding the structure of service or telecommunications networks, and designing technology supply chains. Tactical issues include plant layout and structure, project management methods, and equipment selection and replacement. Operational issues include production scheduling and control, inventory management, quality control and inspection, traffic and materials handling, and equipment maintenance policies.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Acquire knowledge and understand the underlying principle of Operations Management and concept of Logistics.
- 2. Analyze OM theories and tools on contemporary issues.
- 3. Investigate Project Management and evaluate its outcome.
- 4. Function effectively as individual and as team member in conducting experimental work.
- 5. Comprehend and write effective reports and make effective presentations of case studies for further analysis.

# Reference

1. Russel & Taylor, Operations Management, 9<sup>th</sup> Edition, John Wiley & Sons, 2017



- 2. William J. Stevenson and Chee Chuong Sum, Operations Management: An Asian Perspective, 9<sup>th</sup> Edition, McGraw Hill, 2010.
- 3. Heizer, J. and Render B, Operations Management, 10<sup>th</sup> Edition, Pearson-Prentice Hall, 2011

COURSE CODE	: EMT 3612
COURSE NAME	: FINAL YEAR PROJECT I
	PROJEK TAHUN AKHIR I

2 Credit Hours	
Pre-requisite	: Taken
	Mechanical Engineering Design EMM 3573
	Mechanics of Machines EMM 3533
	Strength of Materials II EMM 3433
	Fluid Mechanics II EMM 3523
	Thermodynamics II EMM 3513

# **Course Synopsis**

This course introduces students how to do research, identify problems, propose solution to problems and gather relevant information to the problem. It will teach students to do literature survey in order to understand the nature of the problem and investigate work done by other researchers in line with their research. This course will also provide the ability for the students to plan and manage their work in certain amount of time.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Identify and formulate engineering problem.
- 2. Research and review relevant information of scientific literatures.
- 3. Strategise and design method for solving the identified problems.
- 4. Analyze, evaluate, interpret and synthesize relevant data/information/results.
- 5. Behave ethically and professionally.
- 6. Communicate effectively both orally and in written form.
- 7. Plan and manage projects tasks independently.
- 8. Effectively conduct project and perform task individually.



(Refer to any subject course references related to project and research methodology guidance)

(To be provided by the respective supervisors)

# COURSE CODE : EMT 3624 COURSE NAME : FINAL YEAR PROJECT II PROJEK TAHUN AKHIR II

4 Credit Hours

Pre-requisite : Final Year Project I EMT 3612

#### **Course Synopsis**

This course introduces students how to do research, identify problems, propose solution to problems and gather relevant information to the problem. It will teach students to do literature survey in order to understand the nature of the problem and investigate work done by other researchers in line with their research. This course will also provide the ability for the students to plan and manage their work in certain amount of time.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Analyze problems and draw relevant conclusion.
- 2. Research and review relevant information of scientific literatures.
- 3. Design and establish solutions for the identified problems.
- 4. Analyze, evaluate, interpret and synthesize relevant data/information/results.
- 5. Utilize modern tools as an aid to solve problems.
- 6. Behave ethically and professionally.
- 7. Communicate effectively both orally and in written form.
- 8. Plan and manage projects tasks independently.
- 9. Effectively conduct project and perform task individually.

#### Reference

(Refer to any subject course references related to project and research methodology guidance)

(To be provided by the respective supervisors)

# SYNOPSIS OF ELECTIVE CORE COURSES (TECHNICAL SPECIALIZATION) BACHELOR OF MECHANICAL ENGINEERING PROGRAM (ZK08)

# COURSE CODE : EME 3713 COURSE NAME : COMPOSITE MATERIALS BAHAN KOMPOSIT

3 Credit Hours	
Pre-requisite	: None

# **Course Synopsis**

This course introduces students to some major views and theories in the area of composite materials especially in the polymer based composite learning with emphasis on the types of materials, production methods, quality assurance, failure analysis, test methods and the mechanics of laminated composites. It will examine some key issues in the mechanics of laminated composites with special, focus on the stress-strain relationship and interaction to the extensional, coupling and bending stiffness matrices in promoting learning. The course will also provide a visit to industries dealing with polymer based composite materials in order the students to understand more regarding the practical sides of the subject.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain types of materials and production methods used to form various fibrous composites.
- 2. Analyze the micromechanical and macromechanical properties of the lamina and laminate for fiber reinforced composite materials.
- 3. Investigate different types of failure criteria in laminated composites.

# References

1. Jones, R.M., 1999, Mechanics of Composite Materials, 2nd Edition, Taylor & Francis.



- 2. V.V. Vasiliev and E.V. Morozov, 2001, Mechanics and Analysis of Composite Materials, Elsevier.
- 3. D. Gay, Composite Materials Design and Applications, CRC Press LLC. 2014,
- 4. Autar K. Kaw, 2006, Composite Materials, 2nd Edition, Taylor & Francis.

# COURSE CODE : EME 3723 COURSE NAME : SYSTEM, STRUCTURE AND DYNAMICS OF GROUND VEHICLES SISTEM, STRUKTUR AND DINAMIK KENDERAAN

3 Credit Hours	
Pre-requisite	: None

# Course Synopsis

This course introduces the basic system and structure of automotive vehicles and studies the dynamic and handling characteristics of the vehicle at theoretical and computational approaches. Topics covered include: ride model, handling model, tyre model, location of vehicle CG, tyre normal forces, vehicle loads, systems and structure of automotive vehicle. Matlab-SIMULINK software and CarSimEd will be used throughout the course for modeling and analysis.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Understand the basic system and structure of automotive vehicles as well as the fundamentals of the vehicle dynamics and handling.
- 2. Analyze the concept of vehicle system and structure.
- 3. Investigate the concept of vehicle system and structure.

- 1. Hans Pacejka. Tire and Vehicle Dynamics. Butterworth-Heinemann, 2012
- 2. Dean Karnopp. Vehicle Dynamics, Stability, and Control. CRC Press, 2016.
- 3. Bruce P. Minaker. Fundamentals of Vehicle Dynamics and Modelling. John Wiley & Sons Ltd, 2019

# COURSE CODE : EME 3733 COURSE NAME : TURBOMACHINERY MESIN TURBO

3 Credit Hours Pre-requisite : None

# Course Synopsis

Turbomachines are devices in which energy is transferred either to, or from a continuously flowing fluid by the dynamic of one or more moving blade rows. So, main categories of turbomachine are identified as absorb or produce power to the flowing fluid. Pumps and compressors are used to give energy/power to incompressible and compressible fluid respectively. Turbines, on the other hand, absorb power from both incompressible fluid (hydraulic turbines) and compressible fluid (gas or steam turbines). Pumps, compressors and turbines were design to handle radial, axial or mixed flow of the fluid. In most applications, such as jet engine, compressor and turbine were attached together on the same shaft. This is due to the almost infinite range of service requirements which needs to provide optimum conditions of operation.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Apply principle and theories in all topics as given in the lecture contents and syllabus regarding hydraulic and compressible fluid flow machines.
- 2. Formulate and analyses the engineering problems related to hydraulic flow machines (Pumps and turbines) and Compressible flow machine such as centrifugal compressor, radial gas turbines, axial flow compressor and axial flow gas turbine (by using Mollier chart).
- 3. Investigate and case study involving turbomachines.

# References

1. A.T. Sayers, Hydraulic & Compressible Flow Turbomachines, McGraw-Hill 1990.

#### 2. S. M. Yahya, Turbines, Compressors and Fans, 4<sup>th</sup> Edition. McGraw-Hill, 2011.

# COURSE CODE : EME 3743 COURSE NAME : NON DESTRUCTIVE TESTING UJIAN TANPA MUSNAH

3 Credit Hours Pre-requisite : None

# Course Synopsis

This course shall cover the basic theory of NDT and the methods of NDT that are widely use in the industry. This course also covers the execution, evaluation and interpretation of each NDT techniques. The advantages, limitations and main application of NDT techniques are also provided. At the end of the course, students should be able to acquire knowledge on the fundamentals of NDT, relate and describe the operating principle and application of various techniques that are typically used in industry, design system for quality assurance, engineering inspection, maintenance testing, product certification or intended industrial applications and solve problems related to basic testing system.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain the basic principle of NDT techniques.
- 2. Apply NDT techniques to asses defect in engineering components.
- 3. Investigate the strength, limitations and select the appropriate NDT techniques in relation with industrial problem.

- 1. Mix, P.E., Introduction to NDT:aining guide, 2<sup>nd</sup> edition, John Wiley New York, 1987.
- 2. Raj, B. Jayakumar, T., and Thavasimuthu, M., Practical Non-Destructive Testing, 2<sup>nd</sup> edition.Woodhead Publishing Limited, Cambridge, 1996.
- 3. Boving, K. G., NDE Handbook: Non-Destructive Examination Methods for Conditioning Monitoring, 2<sup>nd</sup> Edition, Woodhead Publishing Limited, Cambridge, 2000.



- 4. Honeyman, G., Non-Destructive Testing: Characterisation of High-Temperature Materials, 1<sup>st</sup> Edition, The Institute of Metals, London, 1989.
- 5. Shull, P.J, Nondestructive Evaluation: Theory, Techniques, and Applications, Marcel Dekker Inc, 2002.
- 6. Bray, D.E. and R.K. Stanley, Nondestructive Evaluation: A Tool for Design, Manufacturing and Service; CRC Press, 1997.
- 7. ASTM International, ASTM Volume 03.03 Nondestructive Testing.

# COURSE CODE: EME 3753COURSE NAME: AIR-CONDITIONING AND REFRIGERATION<br/>PENYAMANAN UDARA DAN PENYEJUKBEKUAN

3 Credit Hours	
Pre-requisite	: None

# Course Synopsis

In this course, students will be exposed to the knowledge of air conditioning and refrigeration systems. It introduces students the basic elements and operation principles of both systems. In air-conditioning system, it covers type of systems, psychrometric chart analysis, comfort design condition, heat and cooling load calculation and ducted system. The students also learn on the real application and equipment of air-conditioning system with the latest technology in the market.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain an air conditioning and refrigeration system.
- 2. Analyze the performance of the refrigeration cycles, psychrometric chart, cooling load and ducted system.
- 3. Investigate the application of air-conditioning system and related equipment.

- 1. McQuiston,F.C, Parker J.D, Spitler, J.D, Heating, Ventilating and Air Conditioning Analysis and Design ,6<sup>th</sup> edition, Wiley, 2004.
- 2. Pita E.G, Air Conditioning Principles and Systems, 4<sup>th</sup> Edition, Prentice Hall, 2002.
- 3. Eastop, T.D and McConkey, A, Applied Thermodynamics for Engineering Technologists, 5<sup>th</sup> Edition, Longman Scientific & Technical, 1995.
- 4. Carrier Air Conditioning Company, Handbook of Air Conditioning System Design, McGraw Hill.



- 5. ASHRAE, Fundamentals Handbook, 2001.
- 6. Arora C.P, Refrigeration and Air Conditioning, 2<sup>nd</sup> Edition, McGraw Hill, 2001.
- Lemmon, E.W., Bell, I.H., Huber, M.L., McLinden, M.O. NIST Standard Reference Database 23: Reference Fluid Thermodynamic and Transport Properties-REFPROP, Version 10.0, National Institute of Standards and Technology, Standard Reference Data Program, Gaithersburg, 2018.

# COURSE CODE : EME 3763 COURSE NAME : ENERGY EFFICIENT BUILDINGS BANGUNAN CEKAP TENAGA

3 Credit Hours Pre-requisite : None

# Course Synopsis

This course introduces the mechanical and electrical systems in a building. These include air-conditioning, heating, pumping, cooling towers, lighting etc. Students will be exposed to the function of these systems and its energy saving measures. Building envelopes and indoor air quality for creating energy efficient building are also included in this course.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain the mechanical and electrical systems available in a building.
- 2. Analyze the energy saving measures in a building.
- 3. Investigate energy consumption and possible energy saving measures of a selected building.

- 1. Lal Jayamaha, Energy- Efficient Building Systems, Green Strategies for Operation and Maintenance, McGraw Hill, Singapore, 2006.
- 2. Craig B. Smith and Kelly E. Parmenter, Energy Management Principles, Applications, Benefits, Saving (2nd Edition), Elsevier, Singapore, 2016
- 3. ANSI/ASHRAE Standard 62.1-2016 Ventilation for Acceptable Indoor Air Quality.

# COURSE CODE : EME 3773 COURSE NAME : AERODYNAMICS AERODINAMIK

3 Credit Hours Pre-requisite : None

# Course Synopsis

This course introduces the basic concepts of aerodynamics, as an extension and more focused from the fluid mechanics courses. The course starts with a review of the basic fluid mechanics theory, followed by inviscid flows. The geometry and aerodynamics analysis of airfoil, wings, thin airfoil theory in incompressible flows as well as flows on finite wings are given. The second half of the course will cover the concepts of aerodynamics in viscous flow, involving the boundary layer flows followed by compressible subsonic and supersonic flows past airfoils and wings.

#### **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain the basic aerodynamic concepts in inviscid and viscous flow.
- 2. Analyze the airfoil and wing aerodynamic performances in incompressible and compressible flow.
- 3. Investigate and solve real aerodynamics problem in engineering by applying the aerodynamics concepts.

- 1. Anderson, J.D. Jr., Fundamental of Aerodynamics, 5<sup>th</sup> Edition. New York: McGraw-Hill Inc, 2010.
- 2. Bertin, J.J. & Cummings, R.M., Aerodynamics for Engineers, 5<sup>th</sup> Edition. Upper Saddle River: Pearson Prentice-Hall, 2009.



- 3. Antonio, F., Elements of Aerodynamics of Supersonic Flows. New York: Dover Publications, 2005.
- 4. Schlichting, H. & Gersten, K. Boundary Layer Theory, 8<sup>th</sup> Edition. Dordrecht: Springer-Verlag.

#### COURSE CODE : EME 3783 COURSE NAME : COMBUSTION PEMBAKARAN

3 Credit Hours	
Pre-requisite	: None

# **Course Synopsis**

Combustion is a critical issue impacting energy utilization, sustainability, and climate change. The challenge is to design safe and efficient combustion systems for many types of fuels in a way that protects the environment and enables sustainable lifestyles. Emphasizing the use of combustion fundamentals in the engineering and design of combustion systems, this course provides detailed coverage of gaseous, liquid and solid fuel combustion, including focused coverage of biomass combustion, which will be invaluable to new entrants to the field.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain the differences between premixed and diffusion flame.
- 2. Analyze the combustion of gaseous, liquid and solid.
- 3. Investigate a selected combustion system and impact to the environment.

- 1. Chung K. Law, Combustion Physics, Cambridge University Press, 2010.
- 2. Irvin Glassman and Richard A. Yetter, Combustion, 4<sup>th</sup> Edition, Academic Press, 2008.
- 3. Thierry Poinsot and Denis Veynante, Theoretical and Numerical Combustion, 2nd Edition, Edwards, 2005.
- 4. Dougal Drysdale, An Introduction to Fire Dynamics, 3<sup>rd</sup> Edition, Wiley, 2011.

# COURSE CODE : EME 3793 COURSE NAME : TURBOCHARGING PENGECASTURBO

3 Credit Hours Pre-requisite : None

# **Course Synopsis**

This course introduces the working principles of turbocharger and basic turbocharging components in facilitating an internal combustion engine to achieve more power density. The approach used is by applying knowledge of thermodynamics and fluid mechanics to develop Euler turbomachinery equation, besides understanding performance characteristics of turbines and compressors. Apart from that, compressible flow theory is introduced to appreciate the flow phenomena in the radial turbines and compressors. Main losses which contributes to penalty in turbine efficiency is also emphasized. This course also covers various multiple entry turbines designed to accommodate pulsating flow emanating from exhaust of an internal combustion engine. Finally, turbochargers-internal combustion engine matching analysis is explored at both design and off-design operating points.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Describe the main components and working principles in turbocharging system.
- 2. Analyze one dimensional flow in turbines and compressors.
- 3. Investigate suitability of turbocharging components for different engine conditions.

# References

1. Moustapha, H., Zelesky, M.F., Baines, N.C., Japikse, D., Axial and Radial Turbines. Concepts ETI, 2003.



- 2. Japikse, D., and Baines, N.C., Introduction to turbomachinery. Norich Vt and Oxford UK: Concepts ETI, 1994.
- 3. Heywood, J.B., Internal Combustion Engine Fundamental. McGraw-Hill Book Company, 1988.
- 4. Watson, N., And Janota, M.S., Turbocharging the Internal Combustion Engine. London. The Maxmillan Press Ltd, 1982.

# COURSE CODE : EME 3803 COURSE NAME : MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE PEMBELAJARAN MESIN DAN KECERDASAN BUATAN

# **3 Credit Hours**

# **Course Synopsis**

This course will provide students with an understanding of the machine learning concept and techniques. It will emphasize on the study and construction of algorithms that can learn from and make predictions using data. Tom M Mitchell, an expert in Machine Learning said "A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P, if its performance at tasks in T, as measured by P, improves with experience E." Broad concepts of "supervised", "unsupervised" and "reinforced" learning methods will be discussed and explored. This course is structured according the task to be achieved and various techniques commonly used to finish that task will be introduced. The tasks are typically, regression, classification, clustering, and pathfinding (reinforcement learning). The various techniques introduced in this course include decision tree algorithm, nearest-neighbour, naïve-bayes, support vector machine, association rule learning and artificial neural network (ANN). An essential element of computer vision, specifically, convolutional neural network (CNN) will also be introduced. The student will be exposed to real engineering data taken from various industries. At the end of the course, the student should be able to demonstrate an ability to analyse and make predictive models from raw engineering data.

# **Course Outcomes**

At the end of the course students should be able to:

- 1. Explain basic principles of machine learning, artificial intelligence, deep learning and the difference between supervised, unsupervised and reinforced learning philosophies.
- 2. Analyze raw and pre-processed data using machine learning algorithms.
- 3. Investigate visual pattern and image data using convolutional neural network (CNN).



- 1. Brett Lantz, Machine Learning with R, Packt Publishing, 1<sup>st</sup> Edition, 2013. (Reference for most topics in this course).
- Robert I. Kabacoff. R in Action: Data Analysis and Graphics with R, Manning Publications Co. 1<sup>st</sup> Edition, 2011. (Reference for general introduction into R and basic statistical methods).
- 3. Micheal J. Crawley. The R Book. 2<sup>nd</sup> Edition. John Wiley and Sons, 2013 (Reference for general intro into R, basic statistical methods and time series data analysis).
- 4. Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach. Prentice Hall 3<sup>rd</sup> Edition (Reference for Artificial Intelligence, computer vision, supervised, unsupervised and reinforcement learning).



# ELECTRICAL & ELECTRONICS ENGINEERING DEPARTMENT



#### ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

#### **Associate Professor**

Kol Dr. Khairol Amali bin Ahmad (Bersara) B.Sc. Electrical Electronic (West Point), M.Arts (US-CGSC, Ft Leavenworth), M.Sc. (Cranfield), M.Sc. (ISAE-Supaero, Toulouse), Ph.D. (ISAE-Supaero, Toulouse)

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Mej Ir. Dr. Kamaruddin bin Abdul Ghani (Bersara), P.Eng., MIEM B.Sc. Electrical Eng. (Valparaiso University, Indiana), M.Eng. (UTM), Ph.D. (UPNM)

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B.Sc. Electrical Eng. (University of Miami), M.Sc. Electrical Eng. (University of Miami), MBA (Cardiff)

Dr. Muhammad Faiz bin Md Din B.Eng. (Huddersfield), M.Sc. (Huddersfield), Ph.D. in Superconductor (University of Wollongong)

Dr. Nurul Sheeda binti Suhaimi B.Eng. (Ibaraki), M.Eng. (Ibaraki), Ph.D. (Tokyo)

Dr. Siti Noormiza binti Makhtar B.Eng. (Hons.) (UM),M.Eng.(Adelaide),Ph.D. (University of York)

# Lecturer

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Akram bin Abdul Azid B.Eng. (Hons.) (UKM), M.Sc. (UKM)

Azrena binti Abu Bakar B.Eng. (Hons.)(MMU), M.Eng. (UM)

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Lt Kdr Ir. Hardy Azmir Anuar RMN, P.Eng.\* B.Eng (UTM), M.Eng (UTM)

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Nor Laili binti Ismail\* B.Eng. Electronics (UMP), M.Sc. (Nottingham)

Tengku Norliza binti Tengku Mohamad B.Sc. Electronic & Electrical Eng.(Widener University, Pennsylvania), M.Sc. (UKM) Kamarul 'Asyikin binti Mustafa B.Eng.(Tokyo), M.Eng. (UKM)

Mohd Salman bin Mohd Sabri B.Eng. (UTM), M.Eng. (UTM)

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Muhammad Hakirin bin Roslan\* Dip. Electrical Eng.(UTHM), B.Eng. (Hons.) (UTHM), M.Sc. (UPM)

Mohd Solehin bin Mohd Nasir Dip. Electrical Eng.(UTHM) B.Eng. (Hons.) (UTHM), M.Sc. (UPM)

# Young Lecturer

Dr. Noor Fadzilah binti Mohamed Sharif Dip. Electrical Eng. (UiTM), M.Eng. (Hons.) (Swansea), Ph.D. (UPM)

\* Study leave



# COURSE STRUCTURE AND TOTAL CREDIT REQUIREMENT FOR THE PROGRAM OF BACHELOR OF ELECTRICAL AND ELECTRONICS ENGINEERING WITH HONOURS (ZK23)

The total credit required for graduation is 140 credits and to be completed in eight (8) normal semesters. The course credit breakdown is as follows:

COURSE	CREDIT
University Course: i. Core ii. Elective	24 6
Program Core Courses: i. Faculty ii. Program	20 78
Program Elective Courses (Technical Specialization)	12
TOTAL CREDIT FOR GRADUATION	140



# BACHELOR OF ELECTRICAL AND ELECTRONICS ENGINEERING WITH HONOURS (ZK23) – PROGRAM CORE COURSES

# List of Program Core Courses (78 Credits):

CODE			PRE-REQUISITE	
CODE			CODE	STATUS
EEE 3323	Circuit Analysis I	3	-	
EEE 3313	Digital Electronics	3	-	
EEE 3333	Circuit Analysis II	3	EEE 3323	MT
EEE 3433	Analog Electronics & Devices	3	EEE 3333	MT
EEE 3423	Microprocessor & Microcomputer	3	EEE 3313	MT
EEE 3463	Signals & Systems	3	EEE 3333	MT
EEE 3443	Analog Circuits and Systems	3	EEE 3433	MT
EEE 3513	Principles of Communication	3	EEE 3463	MT
EEE 3483	Instrumentation and Control Engineering	3	EEE 3463	MT
EEE 3583	Power Electronics	3	-	
EEE 3473	Digital Systems	3	EEE 3313	MT
EEE 3553	Power Systems	3	EEE 3333	MT
EEE 3523	Electromagnetic Fields and Waves	3	EFA 3233	MT
EEE 3503	Electrical Machines and Drives	3	EEE 3583	MP
EEE 3593	Electrical Power Generation and High Voltage Engineering	3	EEE 3553	MP
EEE 3643	Electronic Drives and Applications	3	EEE 3503	MT
EEE 3623	Engineering Management	3	-	
EEE 3633	Engineers in Society	3	-	
EEE 3653	Electrical Energy Utilization	3	EEE 3553	MT
EEE 3574	Industrial Training	4	Passed 60 credit hours	
EEE 3311	Engineering Lab I	1	-	
EEE 3321	Engineering Lab II	1	EEE 3311	MT
EEE 3331	Engineering Lab III	1	EEE 3321	MT
EEE 3341	Engineering Lab IV	1	EEE 3331	MT
EEE 3351	Engineering Lab V	1	EEE 3341	MT
EEE 3361	Engineering Lab VI	1	EEE 3351	MT
EEE 3562	Capstone I	2	EEE 3433 EEE 3423	MT
EEE 3573	Capstone II	3	EEE 3562	MP
EEE 3602	Final Year Project I	2	EEE 3573	MT
EEE 3614	Final Year Project II	4	EEE 3602	MP
Note: MP – Mu	st Pass; MT – Must Taken			

# PROGRAM ELECTIVE COURSES (TECHNICAL SPECIALIZATION)

List of Program Elective Courses (Technical Specialization)– Track Power (12 Credits):

CODE	COURSES	CREDIT	PRE-REQUISITE	
CODE	COURSES	CREDIT	CODE	STATUS
EEP 3703	Advanced Power Systems	3	-	
EEP 3713	Renewable Energy	3	-	
EEP 3723	Power System Economics	3	-	
EEP 3733	Power System Protection	3	-	
EEP 3743	Electrical Condition Monitoring	3	-	
EEP 3753	Photovoltaic System & Applications	3	-	

List of Program Elective Courses (Technical Specialization) – Track Communication (12 Credits):

CODE	COURSES	CDEDIT	PRE-REQUISITE	
CODE	COURSES	CREDIT	CODE	STATUS
EET 3503	Digital Communications	3	-	
EET 3613	Digital Signal Processing and Applications	3	-	
EET 3623	Antenna and Radio Propagation	3	-	
EET 3633	Data Communication & Multimedia Systems	3	-	
EET 3703	Wireless and Satellite Communications	3	-	
EET 3713	Antenna Engineering	3	-	
EET 3723	Microwave Engineering	3	-	
EET 3733	Introduction to Radar	3	-	
EET 3743	Optical Communication Systems	3	-	

List of Program Elective Courses (Technical Specialization) – Track Computer (12 Credits):

CODE	COURSES		PRE-REQUISITE	
CODE	COURSES	CREDIT	CODE	STATUS
EEC 3513	Computer Architecture & Organization	3	-	
EEC 3703	ASIC Design	3	-	
EEC 3713	Introduction to VLSI Design	3	-	
EEC 3723	Embedded System	3	-	
EEC 3733	Software Design and Implementation	3	-	
EEC 3743	Computer Security	3	-	
EEC 3753	Artificial Intelligence	3	-	



List of Program Elective Courses (Technical Specialization) – Track Nanotechnology (12 Credits):

CODE	COURSES		PRE-REQUISITE	
CODE	COURSES	CREDIT	CODE	STATUS
EEN 3703	Solid-State Electronic Devices	3	-	
EEN 3713	Nanoelectronic Device Fabrication and Characterization	3	-	
EEN 3723	Electronic Materials	3	-	
EEN 3733	Nanotechnology and Applications	3	-	
EEN 3743	Microelectronics Reliability & Failure Analysis	3	-	

List of Program Elective Courses (Technical Specialization) – Track Bioinstrumentation (12 Credits):

CODE	COURSES		PRE-REQUISITE	
CODE	COURSES	CREDIT	CODE	STATUS
EEB 3703	Biomedical Instrumentation	3	-	
EEB 3713	Biomedical Image Processing	3	-	
EEB 3723	Cell, Biomaterial, and Tissue Engineering	3	-	
EEB 3733	Artificial Intelligent and Machine Learning	3	-	
EEB3743	Optoelectronic	3	-	

# CURRICULUM STRUCTURE BACHELOR OF ELECTRICAL AND ELECTRONICS ENGINEERING WITH HONOURS (ZK23)

	FIRST YEAR						
SEMESTER 1				SEMESTER 2			
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
		U	NIVERSITY	CORE COU	IRSE		
DUS 3012	Military History	2	-	MPU 3132	Appreciation of Ethics and Civilizations	2	-
MPU 3142	Philosophy and Current Issues	2	-				
LLE 3012	English For Academic Writing	2	-				
DUS 3022	Introduction to Strategic Studies	2	-				
		UNI	VERSITY EI		DURSE		
PLS 3111	PALAPES**	1**	-	QKX 31X2/ ALK 3112/ PLS	Co-Curiculum/ General Military Training*/ PALAPES**	2/2*/1 **	-
	1		FACULTY C		SE	J	
EFA 3253	Engineering Mathematics I (Calculus III)	3	-	EFA 3213	Engineering Mathematics II (Differential Equation)	3	-
				EFC 3223	Computing I (C and C++)	3	-
	1	F	PROGRAM	CORE COU	RSE	n:	
EEE 3323	Circuit Analysis I	3	-	EEE 3313	Digital Electronics	3	-
EFB 3212	Introduction to Engineering	2	-	EEE 3333	Circuit Analysis II	3	EEE 3323 <sup>#</sup>
EEE 3311	Engineering Lab I	1	-	EEE 3321	Engineering Lab II	1	EEE 3311 <sup>#</sup>
TOTAL		17/17*/ 18**		TOTAL		17/17* /16**	

- Civillian Student
- \* Cadet Officer
- \*\* PALAPES
- + Must Pass
- # Must Taken



	SECOND YEAR						
	SEMESTE	ER 3		SEMESTER 4			
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
		UNI	ERSITY CO	RE COURS	E		
				MPU 3312	Nationhood in World Politics	2	-
				LLE 3032	Al-Ghazali's Dialogue: English Communication	2	-
	1	UNIVE		CTIVE COUI	RSE	1	I
QKX 31X2/ ALK 3122/ PLS	Co-Curiculum / General Military Training* / PALAPES**	2/2*/1**	-	QKS 3172/ PLS 3141	Unarmed Combat / PALAPES	2*/1**	-
		FA	CULTY COR				
EFA 3233	Engineering Mathematics IIIA (Complex Variable)	3	-	EFA 3223	Engineering Mathematics IV (Statistics)	3	-
EFC 3213	Computing II (Numerical Methods and Engineering Softwares)	3	-				
		PRC	OGRAM CO	RE COURSI			
EEE 3433	Analog Electronics & Devices	3	EEE 3333 <sup>#</sup>	EEE 3443	Analog Circuits & Systems	3	EEE 3433 <sup>#</sup>
EEE 3423	Microprocessor & Microcomputer	3	EEE 3313 <sup>#</sup>	EEE 3513	Principles of Communication	3	EEE 3463 <sup>#</sup>
EEE 3463	Signals & Systems	3	EEE 3333 <sup>#</sup>	EEE 3483	Instrumentation & Control Engineering	3	EEE 3463 <sup>#</sup>
EEE 3331	Engineering Lab III	1	EEE 3321 <sup>#</sup>	EEE 3341	Engineering Lab IV	1	EEE 3331 <sup>#</sup>
TOTAL		18/18*/17 **		TOTAL		17/19* /18**	

Civillian Student

\* Cadet Officer

\*\* PALAPES

+ Must Pass

# Must Taken



	THIRD YEAR						
	SEMESTE	ER 5		SEMESTER 6			
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
			UNIVERSITY	CORE COU	RSE		
LLF 3XX1/ LLA 3XX1	Foreign Language I	1	-	LLF 3XX1/ LLA 3XX1	Foreign Language II	1	-
DUS 3032	Military Law and Laws of Armed Conflict	2	-	DUM 3022	Military Leadership	2	-
				MPU3412 or MPU3422	Human Movement Science or Community Service	2	-
		U	<b>IVERSITY E</b>	LECTIVE CO	URSE		
QKX 31X2/ PLS 3151	Co-Curiculum/ PALAPES**	2/1**	-	PLS 3161	PALAPES**	1**	-
		1	PROGRAM		RSE	1	
EEE 3473	Digital Systems	3	EEE 3313 <sup>#</sup>	EEE 3503	Electrical Machines & Drives	3	EEE 3583+
EEE 3553	Power Systems	3	EEE 3333 <sup>#</sup>	EEE 3573	Capstone II	3	EEE 3562⁺
EEE 3583	Power Electronics	3	-	EEE 3593	Electrical Power Generation & High Voltage Engineering	3	EEE 3553+
EEE 3562	Capstone I	2	EEE 3433 <sup>#</sup> EEE	EEE 3523	Electromagnetic Fields & Waves	3	EFA 3233 <sup>#</sup>
EEE 3351	Engineering Lab V	1	EEE 3341 <sup>#</sup>	EEE 3361	Engineering Lab VI	1	EEE 3351 <sup>#</sup>
TOTAL (I)		17/15*/ 16**		TOTAL (I)		18/18*/ 19**	

Civillian Student

\* Cadet Officer

\*\* PALAPES

+ Must Pass

# Must Taken

	THIRD YEAR					
INTER-SESSION						
CODE	COURSE	CREDIT	PRE- REQUISITE			
EEE 3574	Industrial Training	4	Passed 60 Credit Hours			
TOTAL		4				

	FOURTH YEAR						
	SEMESTER	R 7			SEMESTE	R 8	
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE
		UNIV	ERSITY CO	RE COURSE		T	1
MPU 3212	Basic Entrepreneurship	2	-				
		PRC	OGRAM CO	RE COURSE			
EEE 3602	Final Year Project I	2	EEE 3563 <sup>#</sup>	EEE 3614	Final Year Project II	4	EEE 3602⁺
EEE 3643	Electronic Drives & Applications	3	EEE 3503 <sup>#</sup>	EEE 3653	Electrical Energy Utilization	3	EEE 3553 <sup>#</sup>
EEE 3633	Engineers in Society	3	-	EEE 3623	Engineering Management	3	-
	PROG	RAM TEC	HNICAL SP	ECIALIZATIO	ON COURSE		
EEP/EET/ EEC/EEB/ EEN 37X3	Technical Specialization I	3	-	EEP/EET/ EEC/EEB/ EEN 37X3	Technical Specialization III	3	-
EEP/EET/ EEC/EEB/ EEN 37X3	Technical Specialization II	3	-	EEP/EET/ EEC/EEB/ EEN 37X3	Technical Specialization IV	3	-
TOTAL		16		TOTAL		16	

Civillian Student

\* Cadet Officer

- \*\* PALAPES
- + Must Pass
- # Must Taken

# SYNOPSIS OF PROGRAM CORE COURSES BACHELOR OF ELECTRICAL AND ELECTRONICS ENGINEERING WITH HONOURS (ZK23)

COURSE CODE	: EEE 3323
COURSE NAME	: CIRCUIT ANALYSIS I
	ANALISIS LITAR I

3 Credit Hours Pre-Requisite : None

# **Course Synopsis**

This subject is the foundation for most of the other courses in the electrical engineering program. It is designed to expose students to the fundamental of electric circuits, laws and theorems and circuit techniques. This course focusses on DC electric circuits. At the end of the course, students should be able to understand laws and theorems of electric circuits involving DC sources. The students should also be able to apply circuit theorems and analysis techniques to analyze DC electric circuits.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Identify and summarize basic concepts and laws on circuit elements and circuitry connections.
- 2. Apply the laws and theorems, and solve problems on DC circuits.
- 3. Analyze DC circuit using modern tool.

- 1. Alexander, Sadiku, Fundamentals of Electric Circuits, 6th Edition, McGraw Hill, 2016
- 2. Dorf, Svobodo, Introduction to Electric Circuits, 9th Edition, John Wiley & Sons, 2013
- 3. Boylestad, Introductory Circuit Analysis, 13<sup>th</sup> Edition, Prentice Hall, 2015
- 4. Nilsson, Riedel, Electrical Circuit, 10th Edition, Prentice Hall, 2014



# COURSE CODE : EEE 3311 COURSE NAME : ENGINEERING LABORATORY I MAKMAL KEJURUTERAAN I

1 Credit Hours Pre-requisite : None

# Course Synopsis

To give the basic knowledge skill to the students regarding on installation, design and connection of electrical single phase circuit. Also to provide students the skills of using some common electrical components and measuring instruments normally used in electrical engineering laboratories.

# **Course Outcomes**

At the end of this course students should be able to:

- 1. Apply and classify electrical methods and techniques on domestic single phase wiring.
- 2. Conduct and assemble electrical wiring, installation and testing works of domestic electrical installation that follows requirement and electrical installation act and regulations.
- 3. Explain the theory and propose a work report for a domestic electrical installation using standard format.

- 1. Trevor Linsley, Basic Electrical Installation Work, 6th Edition, Newnes, 2005
- 2. Md. Nasir Abd. Manan, Panduan Pendawaian Domestik IEEE, 3rd Edition, ISBN 978-967-950-181-0, 2004
- 3. Abdul Samad Hanif, Pemasangan Dan Penyenggaraan Elektrik, DBP
- 4. John Cadick, Electrical Safety Handbook, 4<sup>th</sup> Edition, McGraw-Hill, ISBN-13: 978-0071745130, 2012.



# COURSE CODE : EEE 3313 COURSE NAME : DIGITAL ELECTRONICS ELEKTRONIK DIGIT

3 Credit Hours Pre-requisite : None

# Course Synopsis

This course exposes students to fundamental of digital electronic field, advantages and disadvantages of digital and analog, number and code systems, combinational logic elements and sequence basics. Emphasis is put on output equation generation and truth table for realization using design and minimization techniques. The rationale behind the minimization is also discussed and further elaborated. Besides that, this course is also focused on designing simple combinational and sequential logic circuits, arithmetic logic circuits, analysis and synthesis of combinational circuits designed by traditional methods, as well as some introduction to ECAD.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Apply knowledge of combinational digital circuit to complex engineering problems.
- 2. Identify and analyze sequential digital circuit problem.
- 3. Knowledge and hands-on skill on ECAD based design of digital circuits.

- 1. Thomas L. Floyd, Digital Fundamental, 11th Edition, Pearson, 2015
- 2. William Kleiz, Digital Electronics: A practical Approach with VHDL, 9th Edition, Pearson, 2014
- 3. Stephen Brown, Zvonko Vranesic, Fundamentals of Digital Logic with Verilog Design, 2nd Edition, McGraw Hill, 2008
- 4. Randy H. Katz, Contemporary Logic Design, 2nd Edition, Pearson, 2006


### COURSE CODE : EEE 3333 COURSE NAME : CIRCUIT ANALYSIS II ANALISIS LITAR II

3 Credit Hours Pre-requisite : Circuit Analysis I EEE 3323 (Must Taken)

# Course Synopsis

This subject is a continuation of Circuit Analysis I which is focusing on the analysis of DC system. In this subject, the analysis of electrical circuits is extended to AC system which covers sinusoidal steady state, balanced three-phase system, frequency response, Laplace transform, and two-port network. The calculation involves complex numbers and transformation of polar to rectangular form and vice versa. Some of the knowledge gained from Circuit Analysis I (network theorems and analysis methods) is required for this subject.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Identify and summarize the fundamental theorems on AC circuits, Laplace transformation and two-port network analysis.
- 2. Apply fundamental circuit theorems, Laplace transformation and two-port network analysis to analyze problems of AC circuits.
- 3. Analyze AC circuits using appropriate modern tool.

- 1. Alexander, Sadiku, Fundamentals of Electric Circuits, 6th Edition, McGraw Hill, 2017
- 2. Nilsson, Riedel, Electrical Circuit, 10th Edition, Prentice Hall, 2014
- 3. Dorf, Svoboda, Introduction to Electrical, 9th Edition, John Wiley & Sons, 2013
- 4. De Carlo, Lin, Linear Circuit Analysis: Time Domain, Phasor, and Laplace Transform Approach, Oxford University, 2001
- 5. Irwin J. D, Basic Engineering Circuit Analysis, 10th Edition, John Wiley & Sons, 2011



### COURSE CODE : EEE 3321 COURSE NAME : ENGINEERING LABORATORY II MAKMAL KEJURUTERAAN II

1 Credit Hours Pre-requisite : Engineering Lab I EEE 3311 (Must Taken)

# Course Synopsis

To give the basic knowledge skill to the students regarding on installation, design and connection of electronic circuits. Also to provide students the skills of using some common electronics components and measuring instruments normally used in electronic engineering laboratories.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Apply and classify electronic methods and techniques on electronic circuit.
- 2. Conduct and assemble, installation and testing works of electronic circuit that follows requirement and electronics installation regulations.
- 3. Explain the theory and propose a work report for an electronic circuit using standard format.

- Boylested and Nashelsky, Electronic Devices and Circuit Theory, Prentice Hall
  B. L. Theraja & A. K. Theraja, A Textbook of Electrical Technology
- 2. Hikmet Sahin, Proteus Design Suite 8, Altas Yayinlari, ISBN-13: 978-9758834303, 2000.
- 3. Clyde F. Coombs, Jr., and Happy T. Holden, Printed Circuit Handbook, 7<sup>th</sup> Edition, Mc-Graw Hill, ISBN-13: 978-0071833950, 2016



# COURSE CODE : EEE 3433 COURSE NAME : ANALOG ELECTRONICS AND DEVICES ELEKTRONIK DAN PERANTI ANALOG

3 Credit Hours Pre-requisite : Circuit Analysis II EEE 3333 (Must Taken)

# Course Synopsis

This is an introduction course to basic semiconductors and analog devices such as diode, bipolar junction transistors (BJTs), metal–oxide–semiconductor field-effect transistors (MOSFETs), including understanding on their characteristics which are required as a knowhow in electronic circuit designs. It mostly covers the basic of circuit theories and the application aspects of analog electronics and devices. The models of basic calculations based on the lectures will be given to further improve student's understanding. This field will also be further discussed in Analog Circuit and Systems in the next semester.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Describe the theories and basic principles of diodes, BJT and MOSFET.
- 2. Apply the theories and basic principles, and also solve problems of diodes, BJT and MOSFET.
- 3. Evaluate the performances of amplifier in term of frequency response for certain applications.

- 1. Thomas L. Floyd, Electronic Devices Conventional Current Version, 10th Edition (International Edition), Pearson Prentice Hall, 2019
- 2. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 11th Edition (International Edition), Pearson Education, 2013
- 3. Rizzoni G., Principles and Applications of Electrical Engineering, 6th Edition, McGraw-Hill, 2015
- 4. Malvino A. P., Electronic Principles, 8th Edition, Glencoe: McGraw-Hill, 2016
- 5. Neamen D. A., Electronic Circuit Analysis and Design, 2nd Edition, McGraw-Hill, 2001



# COURSE CODE : EEE 3423 COURSE NAME : MICROPROCESSOR & MICROCOMPUTER MIKROPEMPROSES & MIKROKOMPUTER

3 Credit Hours Pre-requisite : Digital Electronics EEE 3313 (Must Taken)

# Course Synopsis

This course introduces the students to the basic principles and applications of microprocessor and microcontroller. The course emphasizes on understanding the fundamentals of microprocessor and microcontroller operation. The course also Introduces assembly language programing in microprocessor and microcontroller environment. Finally, the course provides students with experience on designing assembly program for basic interfacing systems.

# **Course Learning Outcomes**

At the end of this course students be able to:

- 1. Apply knowledge of microprocessor and microcontroller to complex engineering problems.
- 2. Identify and analyses complex engineering problem using hardware and software architecture of microprocessor and microcontroller.
- 3. Design and program a basic microcontroller-embedded system to complex engineering activities, with an understanding of the limitations.
- 4. Demonstrate knowledge and understanding of microprocessor and microcontroller principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

- 1. Walter A. T. Avtar S., The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications, 4th Edition, Pearson, 2014
- 2. Lucio Di Jasio et al. "PIC Microcontrollers: Know It All".Newnes, 2007
- 3. Bates M., PIC Microcontrollers: An Introduction to Microelectronics, 3rd Edition, Newnes, 2011
- 4. Brey B. B., Intel Microprocessors, 8th Edition, Prentice Hall, 2008
- 5. Mazidi M. A., Mazidi J. G., Causey D., The x86 PC: Assembly Language, Design, and Interfacing, 5th Edition, Pearson Education, 2010
- 6. Mazidi M. A., Causey D., McKinlay R., PIC Microcontroller and Embedded Systems using Assembly and C for PIC18, 2nd Edition, MicroDigitalEd, 2016



### COURSE CODE : EEE 3463 COURSE NAME : SIGNAL AND SYSTEM ISYARAT DAN SISTEM

3 Credit Hours Pre-requisite : Circuit Analysis II EEE 3333 (Must Taken)

# Course Synopsis

The aim of this course is to provide basic knowledge and understanding on system theory espacially linear time invariant system for both continuous and discrete time. The content of the course covers topics such as signal and system classification, signal and system representation, type and basic signal operations: sinusoidal, step, pulse, continuous time and discrete convolutions, and mathematical approach in signal and linear system analysis such as Fourier series, Fourier Transform, Laplace transform, z transform and their respective inverse transform. Filter design is also introduced in this course.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Discuss continuous-time signal, discrete-time signals, and systems and make use of characteristic in analysis.
- 2. Show the output of an LTIC system analytically from the applied input.
- 3. Apply the Fourier Series transformation, Laplace Transform in time domain system and z-transform to analyze continuous-time signal, discrete-time signal, and system.
- 4. Analyze signal and system representations using modern tool.

- 1. M Nahvi, Signals & Systems, McGraw-Hill, 2014.
- 2. Charles L. Phillips, John M. Parr and Eve A. Riskin, Signals, Systems and Transforms, 5th Edition, Pearson Prentice Hall, 2014
- 3. Hwei P. Hsu 1995. "Schaum's Outline of Theory and Problems of Signals and Systems". McGraw-Hill.
- 4. Stuller J.A., An Introduction to Signals and Systems, Thomson Canada Limited, Toronto, 2008
- 5. Lathi B. P., Linear Systems and Signals, Oxford University Press Inc, New York, 2005.
- 6. Haykin S and Van Veen B., Signal and Systems, 2nd edition, John Wiley, New York, 2002



### COURSE CODE : EEE 3331 COURSE NAME : ENGINEERING LABORATORY III MAKMAL KEJURUTERAAN III

1 Credit Hours Pre-requisite : Engineering Lab II EEE 3321 (Must Taken)

# Course Synopsis

This laboratory course enables the students to have hands-on experiences working on basic electrical & electronics engineering related equipment. This laboratory consists of experiments, covering topics in Circuit Analysis I (EEE3323), Circuit Analysis II (EEE3333) and Digital Electronics (EEE3313).

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Apply basic electrical and electronics theories through calculation or simulation as preparation prior to conducting experiments.
- 2. Able to analyze, discuss, and conclude based on the data gathered while producing a formal engineering laboratory report.
- 3. Demonstrate knowledge and understanding through laboratory experiment in a team work environment.

- 1. Alexander Sadiku, Fundamentals of Electric Circuits, 6th Edition (International Edition), McGraw-Hill, 2017
- 2. Thomas L. Floyd, Digital Fundamental, 11th Edition, Pearson, 2015
- 3. Mohamed KhalilHani, Starter's Guide to Digital Systems VHDL &Verilog Design, 2nd Edition (Revised Edition 2.4), Desktop Publisher, 2011



### COURSE CODE : EEE 3443 COURSE NAME : ANALOG CIRCUITS AND SYSTEMS LITAR DAN SISTEM ANALOG

3 Credit Hours

Pre-requisite : Analog Electronics and Devices EEE 3433 (Must Taken)

### **Course Synopsis**

This is an advancement course from EEE 3433 Analog Electronics & Devices course where students will learn about Thyristor, types of noise and the effect on circuits, functional electronic circuits such as operational amplifier, basic op-amp circuit, and special-purpose op-amp circuits. This course also exposes student to basic knowledge of active filters, oscillators and voltage regulators, including understanding on their characteristics which is required as a know-how in electronic circuit designs. It mostly covers the basic of circuit theories and the application aspects of analog electronics and devices.

### **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Describe the theories and basic principles of analog circuit and system.
- 2. Identify the principles to solve problems of analog circuit and system.
- 3. Develop solution with integration related theories for real applications.

- 1. Thomas L. Floyd, Electronic Devices Conventional Current Version, 10th Edition (International Edition), Pearson Prentice Hall, 2019
- 2. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 11th Edition (International Edition), Pearson Education, 2013
- 3. Malvino A. P., Electronic Principles, 7th Edition, Glencoe: McGraw-Hill, 2006



### COURSE CODE : EEE 3513 COURSE NAME : PRINCIPLES OF COMMUNICATION PRINSIP-PRINSIP KOMUNIKASI

3 Credit Hours Pre-requisite : Signal and System EEE 3463 (Must Taken)

# Course Synopsis

This course introduces to the students the basic principles of communication system. The importance of modulation and the performance of the system in the presence of noise will be discussed. The students also will be given the fundamental concepts of analog modulation particularly of amplitude and angle modulations. Digital modulation techniques will be exposed to the students such as ASK, PSK, FSK, BPSK, QPSK and QAM. Topics covered include types, modulated waveforms, transmitters, receivers, and transmission bandwidth and noise impact on the modulation system. Various sampling, quantization and line coding techniques will be explained before the study of coded pulse modulation, PCM and delta modulation. Then the waveforms and spectral analysis of bandpass digital transmission will be introduced together with system performance in terms of bit error rate. Methods of signal multiplexing such as TDM, FDM and SDM will be presented and compared. Students will then learn about transmission line and smith chart applications as a mean to improve the performance of the signal transmission.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Appraise the principles of analog communication systems.
- 2. Analyze the principles of digital communication systems.
- 3. Analyze the principles of transmission lines in communication systems.

- 1. Wayne Tomasi, Electronic Communication Systems: Fundamentals Through Advanced, 5th Edition, Pearson Prentice Hall, 2004
- 2. Lathi, B.P., Modern Digital and Analog Communications Systems, 3rd Edition, Oxford University Press, 2003
- 3. Louis E. & Frenzel Jr., Principles of Electronic Communication Systems, 3rd Edition, McGraw-Hill, 2008



### COURSE CODE : EEE 3483 COURSE NAME : INSTRUMENTATION & CONTROL ENGINEERING INSTRUMENTASI & KEJURUTERAAN KAWALAN

3 Credit Hours Pre-requisite : Signal and System EEE 3463 (Must Taken)

# Course Synopsis

This course exposes students to the fundamental knowledge in control system which includes mathematical modelling of dynamic systems, stability, transient response and steady-state error analysis. This course also introduces the basic in measurement and instrumentation systems. Upon completion of the course, students are able to design a control feedback system with desired design specifications and then analyze the performance using software such as MATLAB.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Apply the knowledge of mathematics and science in control system and instrumentation..
- 2. Analyze the stability and the performance of feedback control system.
- 3. Design and analyze control and instrumentation system using suitable software

- 1. Nise, N. S., Control Systems Engineering, 6th Edition, John Wiley and Sons, 2011
- Curtis, D.J., Process Control Instrumentation Technology, 8th Edition, Prentice-Hall, 2013
- 3. Dorf, R.C.; Bishop, R.H., Modern Control Systems, 12th Edition, Prentice-Hall International, Inc., 2011
- 4. Ogata, K., Matlab for Control Engineers, International Edition, Prentice-Hall International, Inc., 2008
- 5. Kuo, B. C., Automatic Control Systems, 7th Edition, Prentice-Hall International, Inc., 1995.
- 6. Bolton, W., Instrumentation and control systems, 2nd Edition, Newnes, 2015
- 7. Lipták, B. G. (Ed.), Instrument Engineers' Handbook, Volume Two: Process Control and Optimization (Vol. 2). CRC press., 2018.



#### COURSE CODE : EEE 3341 COURSE NAME : ENGINEERING LABORATORY IV MAKMAL KEJURUTERAAN IV

1 Credit Hour Pre-requisite : Engineering Laboratory III EEE 3331 (Must Taken)

# **Course Synopsis**

This laboratory course consists of experiments in the area of advanced analog electronics, computer modeling tool and microprocessor. Some of the topics covered are analysis and design of BJTs and transistors, FPGA implementation and AC circuit power analysis. In this lab, the students will apply the theory they had learned and utilize the equipment and tools for solving the assigned engineering problem.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Apply engineering fundamentals to solve complex engineering problems.
- 2. Investigate and apply appropriate techniques and tools to complex design problems.
- 3. Demonstrate and apply knowledge and understanding of engineering and management principles to design problems as a member or leader in a team.

- 1. Louis E. Frenzel Jr., Principles of Electronic Communication System, 4th Edition, McGraw-Hill, 2016
- 2. Thomas L. Floyd, Lab manual for Electronic Devices, Global Edition, 10th Edition, Prentice Hall, 2018
- 3. Mohamed Khalil Hani, Starter's Guide to Digital Systems VHDL & Verilog Design, 2nd
- 4. Edition (Revised Edition 2.4), Desktop Publisher, 2011
- 5. Alexander Sadiku, Fundamentals of Electric Circuits, 6th Edition, McGraw-Hill, 2017



### COURSE CODE : EEE 3473 COURSE NAME : DIGITAL SYSTEM SISTEM DIGITAL

3 Credit Hours Pre-requisite : Digital Electronics EEE 3313 (Must Taken)

# Course Synopsis

This course covers the principles of digital system design. It builds on logic design principles learned in earlier course, digital electronics. This course demonstrates how digital design and rapid prototyping have been facilitated by FPGAs and hardware description languages (HDL). The content of this course includes combinational and sequential logic, finite state machine, register transfer level (RTL) design, design flow, high level design, hardware description language, FPGAs and some advanced topics in HDL.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Apply combinational and sequential logic design into synthesizable HDL.
- 2. Identify and analyze the problems and design a digital system that suit the functional requirement.
- 3. Design solution for ALU, RTL and High Level RTL into HDL.
- 4. Create and apply digital systems using CAD tools and FPGA.

- 1. Frank Vahid, Digital Design, 2nd Edition, John Wiley, 2011
- 2. Stephen Brown & Zvonko Vranesic, Fundamental of Digital Logic with Verilog Design, 3rd Edition, McGraw Hill, 2009
- 3. Morris Mano, Charles R. Kime, Logic and Computer Design Fundamentals, 5th Edition, Pearson, 2016
- 4. Roth J. C. H. & John L. K., Digital System Design using VHDL, 3rd Edition, Cengage Learning, 2017



### COURSE CODE : EEE 3553 COURSE NAME : POWER SYSTEMS SISTEM KUASA

3 Credit Hours Pre-requisite : Circuit Analysis II EEE 3333 (Must Taken)

# Course Synopsis

This course covers operation, performance and analytical technique in electrical power generation, transmission and distribution. The covered topics are introduction to alternative energy sources, complex power, phasors, correction power factor, per-unit system, power quality and utilization, power transformer and generator, modeling of short, medium and long transmission lines and protection system. Power system in military applications will be discussed.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Analyse the power system operations, performance and protection system according to power regulations.
- 2. Conduct unsupervised simulation on power system operation using suitable software.
- 3. Able to explain the theory and do simple calculation on power system generation systems.

- 1. J. D. Glover, Mulukutra. S. Sarma, Thomas J. Overbye, Power System Analysis and Design, 6th Edition, Cengage Learning, 2016
- 2. Hadi Saadat, Power System Analysis, 3rd Edition, PSA Publishing, 2010
- 3. John J. Grainger, Power System Analysis, 1st Edition, McGraw-Hill, 1994
- 4. B. M. Weedy, B. J. Cory, Electric Power Systems, 5th Edition, John Wiley & Sons, Singapore, 2012
- 5. D P Kothari, I J Nagrath, Modern Power Systems Analysis, 4th Edition, McGraw-Hill, 2011
- 6. X. Wang, J. R. McDonald, Modern Power System Planning, 9th Edition, McGraw-Hill, 1994



### COURSE CODE : EEE 3523 COURSE NAME : ELECTROMAGNETIC FIELDS AND WAVES MEDAN DAN GELOMBANG ELEKTROMAGNETIK

3 Credit Hours Pre-requisite : Engineering Mathematics IIIA EFA 3233 (Must Taken)

# **Course Synopsis**

This course is one of the fundamental courses in electrical and electronic engineering. Therefore, the course will introduce and discuss the concept, theory and analysis of electromagnetic wave and field. The purposes are for students to understand the basic theory and capable of applying their knowledge of electromagnetic wave and field.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Apply vector concept and solve vector algebra operation, differential and integral operation in three coordinate systems, and apply static electromagnetic principle and basic theory in static electromagnetic to solve related problems.
- 2. Solve problems related to Maxwell's Equations.
- 3. Conduct a project that is related to electromagnetic fields and waves to meet the industrial requirements and present the outcome of the project with relevant theory of electromagnetic fields and waves for sustainable development.

- 1. Sadiku, M.N.O., Elements of Electromagnetics, 6th Edition, Oxford University Press, 2015
- 2. Hayt, Jr. W.H., Engineering Electromagnetics, 8th Edition, McGraw-Hill International Edition, 2011
- 3. Andrea Macchi, Giovanni Moruzzi and Francesco Pegoraro, Problems in Classical Electromagnetism, 1st Edition Springer, 2017



#### COURSE CODE : EEE 3562 COURSE NAME : CAPSTONE PROJECT I PROJEK REKABENTUK I

2 Credit Hours

Pre-requisite : Analog Electronics and Devices EEE 3433 (Must Taken) and Microprocessor & Microcomputer EEE 3423 (Must Taken)

### **Course Synopsis**

The course to provide an overview of the design process in Electrical and computer engineering design projects. Students are exposed to fundamental theories in system design such as functional decomposition, system behavior, system reliability, etc. through classroom lecture and discussion. Then, it focuses on team-oriented capstone design project for multidisciplinary electric and electronic engineering. By the end of the course, design teams are expected to have established all engineering and marketing requirements, completed architectural design and developed a project plan.

### **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Identify engineering technical problems.
- 2. Propose solutions based on the learned technical knowledge.
- 3. Provide engineering solution with assurance of environmental, sustainability & engineering ethics.

- 1. Dieter, G., Schmidt, L., Engineering Design, 6th Edition, McGraw Hill, 2021.
- 2. Ford, R.; Coulston, C., Design for Electrical and Computer Engineers, 1st Edition, McGraw Hill, 2008.
- 3. Kendall, K.E.; Kendall, J.E., Systems Analysis and Design, 9th Edition, Pearson Education Limited, 2014



#### COURSE CODE : EEE 3351 COURSE NAME : ENGINEERING LABORATORY V MAKMAL KEJURUTERAAN V

1 Credit Hour Pre-requisite : Engineering Laboratory III EEE 3341(Must Taken)

# **Course Synopsis**

This laboratory course enables the students to have hands-on experiences working on communications and power engineering related equipment. In this course, the students in communication (ZK25) and power program (ZK50) will be running different types of experiment depending on their domains. Therefore, student of ZK25 will be conducting experiments related to analogue FM/AM communication and optical communication as well as one power related experiment on Transmission Line Analysis. On the other hand, students of ZK50 will be conducting experiments related to high voltage (breakdown voltage of liquid insulation, measurement of soil resistivity, etc.) and Transmission Line Analysis as well as one communication related experiment on AM communication.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Conduct experiments according to stipulated procedures.
- 2. Demonstrate understanding through explanation of the theory in relation to the experiment and analyse, discuss and conclude the related experiment's findings in a report.
- 3. Work in team to conduct the experiment and produce a formal engineering laboratory report.

- 1. Wayne Tomasi, Electronic Communication Systems: Fundamentals Through Advance., 5th Edition, Prentice Hall, 2004
- Charles I. Hubert, Electrical Machines: Theory, Operating Applications, and Control. 2nd Edition, SUP, 2001
- 3. Louis E. & Frenzel Jr., Principles of Electronic Communication System, 3rd Edition, McGraw-Hill, 2008
- 4. Norman S. Nise., Control Systems Engineering, 5th Edition, Wiley, 2007
- 5. David M. Pozar, Microwave Engineering, John Wiley & Sons Inc., 2004



#### COURSE CODE : EEE 3573 COURSE NAME : CAPSTONE PROJECT II PROJEK REKABENTUK II

3 Credit Hours Pre-requisite : Capstone Project I EEE 3462 (Must Pass)

# **Course Synopsis**

The course is a continuation work of Capstone Project I. In this semester, students implement and test their project under the guidance of a project advisor. Then, the student teams are compulsory to present and exhibit their projects in an exhibition. It covers the aspect of planning and executing project, conducting literature review, market survey and cost analysis, prototype development and testing, documentation and presentation of project output.

### **Course Outcomes**

At the end of this course students should be able to:

- 1. Produce projects utilizing modern equipment & engineering tools.
- 2. Work in team in managing and executing project.
- 3. Communicate effectively through presentation and technical report

- 1. Kendall, K.E.; Kendall, J.E., Systems Analysis and Design, 10th Edition, Pearson Education Limited, 2019.
- 2. Ford, R.; Coulston, C., Design for Electrical and Computer Engineers, 1st Edition, McGraw Hill, 2008.
- 3. Dieter, G., Schmidt, L., Engineering Design, 5th Edition, McGraw Hill, 2013.



### COURSE CODE : EEE 3623 COURSE NAME : ENGINEERING MANAGEMENT PENGURUSAN KEJURUTERAAN

3 Credit Hours Pre-requisite : None

### **Course Synopsis**

This course will expose students to the required knowledge in utilizing appropriate management tools and techniques in the context of Electrical Engineering projects. It covers variety of aspect including issues and management as a problem solving process. Projects tasks deliverables, responsibilities and timing requirement needed to manage project on time and within budget will be elaborated. The necessary knowledge to develop skills for such activities will be provided.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Present solution on engineering management current issues and cases.
- 2. Produce complete solution related to engineering management on selected companies or projects.
- 3. Apply financial accounting, cost accounting and risks management in presenting solution on engineering management issues and cases.

- 1. Chang, Engineering Management: Challenges in the New Millennium, Prentice Hall, 2005
- Eisner, Essentials of Project & Systems Engineering Management, 3rd Edition, Wiley, 2008
- 3. Blanchard, System Engineering Management, 4th Edition, Wiley, 2008
- 4. Smith, Teamwork and Project Management, 4th Edition, McGraw-Hill, 2013
- 5. Cleland, Project Management: Strategic Design and Implementation, 5th Edition, McGraw-Hill, 2007



#### COURSE CODE : EEE 3361 COURSE NAME : ENGINEERING LABORATORY VI MAKMAL KEJURUTERAAN VI

1 Credit Hour Pre-requisite : Engineering Laboratory III EEE 3351 (Must Taken)

# Course Synopsys

This laboratory course enables the students to have hands-on experiences working on communications and power engineering related equipment. In this course, the students in communication (ZK25) and power program (ZK50) will be running different types of experiment depending on their domains. Therefore, student of ZK25 will be conducting experiments related to digital modulation techniques and digital RF communications as well as one power related experiment on half wave rectification. On the other hand, students of ZK50 will be conducting experiments related to topics such as power electronics, electric motors, load flow analysis and one communication related experiment on FM communication.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Conduct experiments according to stipulated procedures.
- 2. Demonstrate understanding through explanation of the theory in relation to the experiment and analyse, discuss and conclude the related experiment's findings in a report.
- 3. Work in team to conduct the experiment and produce a formal engineering laboratory report.

- 1. Wayne Tomasi, Electronic Communication Systems: Fundamentals Through Advance., 5th Edition, Prentice Hall, 2004
- 2. Charles I. Hubert, Electrical Machines: Theory, Operating Applications, and Control. 2nd Edition, SUP, 2001
- 3. Louis E. & Frenzel Jr., Principles of Electronic Communication System, 3rd Edition, McGraw-Hill, 2008
- 4. Norman S. Nise., Control Systems Engineering, 5th Edition, Wiley, 2007
- 5. David M. Pozar, Microwave Engineering, John Wiley & Sons Inc., 2004



### COURSE CODE : EEE 3574 COURSE NAME : INDUSTRIAL TRAINING LATIHAN INDUSTRI

4 Credit Hours

Pre-requisite : Must pass a minimum of 60 credit hours.

# Course Synopsis

Practical training is the platform for the students to get the opportunity to practice and apply knowledge and skills in various real working environments. The ultimate goal is to give exposure, experience and professional skills to the students that will help in shaping them to become an effective and responsible as required by the UPNM vision and mission. Students will undergo a practical training in the duration of 10 weeks at an approved private, government or semi-government agency. The Faculty will release the list of participating agency. Placement at the respective agency will be initiated by applications by the students. Approval of the application is at the discretion of the Department mainly based on the company nature of business and the type of exposure offered.

Through the practical training, the students will:

- Learn new skills and gain practical work experience
- · Explore and make decisions about future career options
- Increase marketability after graduation
- Combine academic knowledge with hands-on work experience
- · Build networks in the selected field of interest
- Learn effective job-strategy technique

### **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Apply appropriate technical skills in various discipline of engineering field.
- 2. Organize solution of related problems based on real application.
- 3. Express good understanding towards professional accountabilities, etiquette and social.

- 1. Undergraduate Handbook.
- 2. Panduan Latihan Industri, Fakulti Kejuruteraan.



### COURSE CODE : EEE 3602 COURSE NAME : FINAL YEAR PROJECT I PROJEK TAHUN AKHIR I

2 Credit Hours Pre-requisite : Capstone II EEE 3573 (Must Taken)

# Course Synopsis

Final year student is required to take a small scale research project. This project aims to expose students to conducting research works in order to solve engineering problems. The research works include literature survey, analysis of previous works, execute research experimental design and works, collecting and analyzing data. In this stage, students have to conduct literature survey in order to understand the nature of the problem and identify the appropriate research methodology.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Plan and handle engineering projects such as design, modelling or experimental projects.
- 2. Gather, apply and analyze relevant information to provide valid project outcomes.
- 3. Defend the work ethically and professionally in both oral and written form.

### References

1. Relevant references, books and journals.



# COURSE CODE : EEE 3633 COURSE NAME : ENGINEERS IN SOCIETY JURUTERA DALAM MASYARAKAT

3 Credit Hours Pre-requisite : None

### **Course Synopsis**

This course highlights to students the profession of engineering, their roles and responsibilities to community. Students are introduced to the relevant acts, regulations, standard and code of engineering ethics as well as intellectual properties. Based on those theories, principles and code of engineering ethics, students will analyze engineering issues and cases where they will be exposed to decision making. Students are required to present the outcome for class discussion.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Recognize the responsibilities of Electrical & Electronic engineers as a professional.
- 2. Discover the requirement and the issues of safety, impact of law, standards and regulations.
- 3. Analyze engineering ethics and engineering cases.
- 4. Develop teamwork and communicate effectively.

- 1. Charles E. Harris, Engineering Ethics Concept and Cases, 4th Edition, Wadsworth Publishing, 2008
- 2. Charles B. Fleddermann, Engineering Ethics, 4th Edition, Prentice Hall, 2011
- 3. J. Campbell Martin, The Successful engineer, personal and professional skills, McGraw Hill, 1993
- 4. Registration of Engineers Act 1967(Revised 2015) and Registration of Engineer Regulation 1990, BEM
- 5. Electricity Supply Act 1990 (Amendment 2001) and Subsidiary Legislations
- 6. Occupational Safety and Health Act 1994



### COURSE CODE : EEE 3614 COURSE NAME : FINAL YEAR PROJECT II PROJEK TAHUN AKHIR II

4 Credit Hours Pre-requisite : Final Year Project I EEE 3602 (Must Pass)

# Course Synopsis

This is a continuation work from Final Year Project I. In this stage, students have to conduct research works by conducting experimental, design or modelling work. Students should perform relevant work independently and convey their findings and ideas effectively both in oral and written form.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Execute engineering projects such as design, modelling or experimental projects with engineering design solutions that meet specified needs.
- 2. Perform data collection and analysis to validate project outcomes.
- 3. Defend the work ethically and professionally in both oral and written form.

### References

1. Relevant references, books and journals.



# SYNOPSIS OF PROGRAM ELECTIVE COURSES (TECHNICAL SPECIALIZATION) BACHELOR OF ELECTRICAL AND ELECTRONICS ENGINEERING WITH HONOURS (ZK23)

#### COURSE CODE : EEE 3503 COURSE NAME : ELECTRICAL MACHINES AND DRIVES MESIN DAN PEMACU ELEKTRIK

3 Credit Hours

Pre-requisite : Power Electronics EEE 3583 (Must Pass)

# **Course Synopsis**

This is an introduction course to electrical machines and drives. Among the contents of this course are an introduction and operating principle of electric machine for direct current (DC) generator and motor; alternating current (AC) generator and motor; single-phase and three-phase synchronous motors and induction motor; electric drives. Electric machines and drives application in real world are discussed at the end of this course.

### **Course Learning Outcomes**

Having successfully completed the course, the students are able to:

- 1. Analyze the properties of electrical machines and drives.
- 2. Conduct unsupervised simulation on electrical machines and drives.
- 3. Relate concept of selected electric machines and drives to real world application.

- 1. D. Zorbas, "Electric machines principles, applications and control schematics", 2nd Edition, 2015, ISBN-13: 978-1133628514.
- 2. N. Mohan, "Electric machines and drives a first course", Wiley, 2012, ISBN: 978-1-118-07481-7.
- 3. M. D. Singh, K. B. Khanchandani , "Power electronics", 2nd Edition, Mc-Graw Hill, 2007, ISBN-13: 978-0-07-058389-4.
- 4. T. Wildi, "Electrical machines, drives, and power systems", 6th Edition, Pearson, 2006, ISBN-13: 978-9332518537.
- 5. S. J. Chapman, "Electric Machinery Fundamentals", 5th Edition, Mc-Graw Hill, 2012, ISBN-13: 978-0073529547.
- 6. M. H. Rashid "Power Electronics; Drives, Circuit and Applications", Fourth Edition, Pearson, 2013, ISBN: 978-0273769088.
- 7. Stephen D.Umans, "Fitzgerald & Kingsley's Electric Machinery", 7th Edition, Mc-Graw Hill, 2014, ISBN: 978-0-07-338046-9.
- 8. A.Hughes & B.Drury, "Electric Motors & Drives (Fundamentals, Types & Applications)", 4th Edition, Newness, 2013, ISBN: 978-0-08-098332-5.



### COURSE CODE : EEE 3583 COURSE NAME : POWER ELECTRONICS ELEKTRONIK KUASA

3 Credit Hours Pre-requisite : None

# Course Synopsis

This is an introduction course to power electronics. Among the contents of this course are overview of power electronics systems, power devices technology and drivers, snubbers, power losses and switching techniques. Single-phase and three-phase for control and uncontrollable rectifier; chopper, inverter and pulse width modulation (PWM) techniques are explained in details in this course. Power electronics applications in real world or military are discussed at the end of this course.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Explain the basic circuit for rectifier, chopper, inverter and converter.
- 2. Analyze the topology of power electronics converter and PWM switching techniques
- 3. Discuss the power electronics system in real world application.
- 4. Conduct unsupervised simulation on power electronics.

- 1. Trzynadlowski, A. M., Introduction to modern power electronics, 3rd Edition, John Wiley & Sons, 2015
- 2. Dokić, B. L., & Blanuša, B, Power Electronics, 3rd Edition, Springer, 2015.
- 3. Rashid, M. H., Power Electronics: Circuits, Devices & Applications, 4th Edition, Prentice Hall, 2013
- 4. Daniel W. Hart, Power Electronics, McGraw-Hill International Edition, ISBN: 978-007-128930-6
- 5. Mohan, Underland and Robbins, Power Electronics; Converters, Application and Design, 3rd Edition, John Wiley and Sons Inc., 2013
- 6. M. D. Singh and K. B. Khanchandani, Power Electronics, 2nd Edition, McGraw-Hill



#### COURSE CODE : EEE 3593 COURSE NAME : ELECTRICAL POWER GENERATION AND HIGH VOLTAGE ENGINEERING PENJANAAN ELEKTRIK KUASA DAN KEJURUTERAAN VOLTAN TINGGI

3 Credit Hours Pre-requisite : Power Systems EEE 3553 (Must Pass)

# Course Synopsis

This course deals with the new emerging technology in electrical power generation and high voltage engineering. For electrical power generation, it concentrates on thermal, nuclear and hydro power station. Detail discussion on high voltage engineering will include electrical breakdown mechanism in insulation systems; generation and measurement aspects. The basic idea of generation, AC generator, dielectric strength of insulating material and electric field stresses when subjected to high voltages will be analyzed. Some of important circuit configurations for the generation of high voltage DC, AC and impulse will be covered. The course also explains some non-destructive tests like surface and internal discharges, partial discharges and tan delta. Familiarity with electrical power system components is useful.

# **Course Outcomes**

At the end of this course students should be able to:

- 1. Demostrate basic concepts of electrical power generation and high voltage technologies.
- 2. Evaluate thermal, nuclear and hydro power generation;electrical breakdown mechanism;measurement of high voltages;partial discharge; and tan delta.
- 3. Gain exposure to electrical power generation and high voltage engineering in industrial applications.

- 1. A. Küchler, "High Voltage Engineering: Fundamentals Technology Applications", 5<sup>th</sup> Edition, Springer, 2018, ISBN-13:978-3642119927.
- 2. A. J. Wood and B. F. Wollenberg, Power Generation, Operation and Control, 3<sup>rd</sup> edition, Wiley, 2014, ISBN 978-0-471-79055-6.
- 3. M. S. Naidu and V. Kamaraju, High Voltage Engineering, 4<sup>th</sup> edition, McGraw-Hill, New Delhi, 2009, ISBN-10: 0-07-066928-7.
- 4. M. Khalifa, High-Voltage Engineering: Theory and Practice, Marcel Dekker Inc., 1990
- 5. E. Kuffel, W. S. Zaengl and J. Kuffel, High Voltage Engineering: Fundamentals, 2<sup>nd</sup> edition, Newnes, Singapore, 2000, ISBN: 0-750-63634-3.
- 6. Bharat Heavy Electricals Limited, Handbooks of Switchgears, McGraw-Hill, USA.



#### COURSE CODE : EEE 3643 COURSE NAME : ELECTRONIC DRIVES AND APPLICATIONS PEMACU ELEKTRONIK DAN APLIKASI

3 Credit Hours Pre-requisite : Electrical Machines and Drives EEE 3503 (Must Taken)

# Course Synopsis

This course is designed to introduce the students to different types of electronics drive under various applications. The topics covered in this course includes; DC drives application and AC drive application with electronics control for both drive system.

# **Course Learning Outcomes**

Having successfully completed the course, the students are able to:

- 1. Apply engineering specialization to solve the AC and DC drive system.
- 2. Evaluate the concept and application of AC and DC drives system.
- 3. Design and analyze the electronics control operation of AC and DC drives system.
- 4. Conduct unsupervised simulation on AC and DC drives system using appropriate software.

- 1. Austin Hughes, Bill Drury, "Electric Motors and Drives : Fundamentals, Types and Applications", Fifth Edition, Elsevier Science & Technology, 2019, ISBN10: 0081026153
- 2. M. H. Rashid "Power Electronics; Drives, Circuit and Applications", Fourth Edition, Pearson, 2013, ISBN: 978-0273769088.
- 3. N. Mohan, Tore M. Undeland and William P. Robbins, "Power Electronics: Converters, Applications, and Design", Third edition, John Whiley and Sons, 2003, ISBN : 978-0471226932.
- 4. Gopal K. Dupey, "Fundamental of Electrical Drives" Second Edition, Alpha Science International Ltd, 2002, ISBN: 84265-0831.



### COURSE CODE : EEE 3653 COURSE NAME : ELECTRICAL ENERGY UTILIZATION PENGGUNAAN TENAGA ELEKTRIK

3 Credit Hours

Pre-requisite : Electrical Power Generation and High Volatge Engineering EEE 3593 (Must Taken)

# **Course Synopsis**

In this strategic course the learner will have an exposure on the concept of utilization of power generation, distribution and overcurrent protection as well as power factor correction issues. The learner also will be introduced to power quality issues and at the same time techniques in tackling the power quality problems.

### **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Investigate on operation of distribution system, earthing system and protection.
- 2. Analyze on distribution system of cabling requirement, voltage drop and power quality issues for a distribution installation.
- 3. Demonstrate the understanding on power utilization in practical applications.

- 1. A.S. Pabla, Electrical Power Distribution, 7th Edition, McGraw Hill, 2019
- 2. IEEE Recommended Practice for Powering and Grounding Electronic Equipment, IEEE Std 1100-1999
- 3. R.K Rajput, Utilization of Electrical Power, 2nd Edition, Laxmi Publications (P) Ltd., 2018.
- 4. R.K Rajput, Power System Engineering, Laxmi Publications (P) Ltd., 2006.
- 5. Math H.J. Bollen, Understanding Power Quality Problems: Voltage Sags & Interruption, Wiley-IEEE Press, 2000.



### COURSE CODE : EEP 3703 COURSE NAME : ADVANCED POWER SYSTEMS SISTEM KUASA MAJU

3 Credit Hours Pre-requisite : None

# Course Synopsis

This course covers deeper system analysis which includes characteristics of faults on transmission line and the protection systems, power flow analysis, power system stability studies and economic operation in power system. Fault calculation using impedances equivalent circuits, single line-to-ground faults and line-to-line faults will be discussed in this course including basic principles for protection against such faults. For power flow analysis, the Gauss-sidel, Newton-Rapson and Fast Decoupled Load Flow methods will be utilised for solving power flow solution. Students will be introduced to power system stability in terms of types of stability studies, swing equation, transient stability, equal area criteria, effect of type of fault on stabilit, computer simulation, methods for improving and maintaining systems stability. The economic aspects of power system operation covering economic dispatch and unit will also be given emphasis in this course.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Utilize the load flow methods to calculate the state variables in a power system.
- 2. Conduct fault calculation due to various faults in power system and the relevant protection system.
- 3. Analyze various power stability issues in power system operation.
- 4. Apply various procedures in ensuring economic operation of power system.

- 1. J.D. Glover, Mulukutra, S. Sarma, Thomas J. Overbye, Power System Analysis and Design, 4th Edition (International Edition), Cengage Learning, 2016
- 2. Hadi Saadat, Power System Analysis, 3rd Edition, McGraw-Hill, 2004
- 3. John J. Grainger, Power System Analysis, McGraw-Hill, 2015
- 4. W.D. Stevenson, Elements of Power System Analysis, 4th Edition, McGraw Hill, 1982
- 5. A.R. Bergen and V. Vijay, Power System Analysis, 2nd Edition, 2003



### COURSE CODE : EEP 3713 COURSE NAME : RENEWABLE ENERGY TENAGA BOLEH DIPERBAHARUI

3 Credit Hours Pre-requisite : None

### **Course Synopsis**

This course addresses the new emerging technologies in renewable energy. It covers the spectrum from solar energy, biomass, hydro, wind, tidal and wave technologies to renewable energy policies, economic factors and environmental impacts. This course also discusses the basic concepts of solar collectors, solar applications, bio-energy sources, production of gaseous and liquid fuels from biomass, types of turbine runner, tidal generator and wind turbine types. At the end of this course, students are required to conduct a mini research on a topic provided by the lecturer.

### **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Appraise various types of renewable energy technologies.
- 2. Analyze the working principle of renewable technologies.
- 3. Model and evaluate renewable energy technologies for real world applications

- 1. G. Boyle, Renewable Energy: Power for a Sustainable Future, 3rd Edition, Oxford University Press, 2012
- 2. G. M. Masters, Renewable and Efficient Electric Power Systems, 2nd Edition, John Wiley & Sons Inc., 2013
- 3. J. Goldemberg, ENERGY: What Everyone Needs to Know, Oxford University Press, 2012
- 4. V. C. Nelson and K. L. Starcher, Introduction to Renewable Energy, 2nd Edition, CRC Press, 2015



# COURSE CODE : EEP 3723 COURSE NAME : POWER SYSTEM ECONOMICS EKONOMI SISTEM KUASA

3 Credit Hours Pre-requisite : None

### Course Synopsis

This course is designed to introduce economic aspects in power system in terms of its market requirement, effects of security and transmission to the electricity pricing and discusses the issue of investments in power generation and transmission equipment.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Explain the economic aspects of electrical energy market.
- 2. Analyze the electricity market and investment in generation of electrical energy and transmission network.
- 3. Model the economic dispatch in power system.

- 1. D. R. Biggar, M. R. Hesamzadeh, The Economics of Electricity Markets, John Wiley & Sons, 2014.
- 2. D. Gan, D. Feng, J. Xie, Electricity Markets & Power System Economics, CRC Press, 2014.
- 3. Jin Zhong, " Power System Economic and Market Operations", CRC Press, 2018, ISBN: 978-1-4822-9904-5.
- 4. D.S. Kirschen, G. Strabac, "Fundamental of Power System Economics", Second Edition, John Wiley, 2019, ISBN: 978-1-1193-0988-8.
- 5. S. Stoft, "Power System Economics: Designing Markets for Electricity", Wiley-IEEE Press, 2002, ISBN: 978-0471150404.



### COURSE CODE : EEP 3733 COURSE NAME : POWER SYSTEM PROTECTION PERLINDUNGAN SISTEM KUASA

3 Credit Hours Pre-requisite : None

# **Course Synopsis**

This course is designed to introduce the concept of power system protection. The students are expected to understand the general concept of protection in power system. It is expected that the students will be able to analyze and design the protection system related to the protection against overvoltage, the setting of over-current and determination of fuses size, circuit breaker setting and is capable to design the protection system.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Analyse the principles and aspects of power system protection.
- 2. Design suitable Power System protection using suitable software.
- 3. Explain theory of power system protection applications.

- 1. J. D. Glover, Mulukutra. S. Sarma, Thomas J. Overbye, Power System Analysis and Design, 6th Edition, Cengage Learning, 2016.
- 2. L.G. Hewitson, M. Brown, R. Balakrishnan, Practical Power System Protection, 1st Edition, Newnes, 2005
- 3. D.P. Kothari, A. Kalam, Power System Protection and Communication, New Age Science, 2009
- 4. P.A. Anderson, Power System Protection, 1st Edition, Wiley-IEEE Press, 1998
- 5. A. Christopoulos, A. Wright, Electrical Power System Protection, 2nd Edition, Springer, 1999.



# COURSE CODE : EEP 3743 COURSE NAME : ELECTRICAL CONDITION MONITORING PENGAWASAN KONDISI ELEKTRIK

3 Credit Hours Pre-requisite : None

# Course Synopsis

This course covers condition monitoring of modern power system assets such as transformers, overhead lines, cables, switchgear, and other transmission and distribution network equipment. The course provides knowledge about the principles of operation of equipment, including failure modes, ageing and modern techniques for assessing asset condition. Factors due to over stresses (including fault currents, lightning, switching and over voltages) that affect power networks are studied and the standard methods for testing are reviewed.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Explain the basic construction, operation and failure mechanisms of important station equipment.
- 2. Identify various condition monitoring and diagnostic techniques of power system equipment.
- 3. Evaluate the condition monitoring and diagnostic techniques of power system equipment.

- 1. T. K. Saha and P. Purkait, Transformer Ageing: Monitoring and Estimation Techniques, Wiley-IEEE Press, 2017.
- 2. RE. James and Su Chi, Condition Assessment of HV Insulation in Power System Equipment, IET, 2008.
- 3. Hugh M. Ryan, High Voltage Engineering and Testing, 3<sup>rd</sup> Edition, IET, 2013.
- 4. Recent trends in the condition monitoring of transformers : Theory, Implementation and Analysis, Springer, 2013.
- 5. JR. Barron, Engineering Condition Monitoring : Practice, Methods and Applications, Longman, England ,1996.
- 6. B.S. Dhillon, Engineering Maintenance: A Modern Approach, CRC Press, Florida, 2002.
- 7. F. Ansari, Condition Monitoring of Materials and Structures, American Society of Civil Engineer, 2000.
- 8. E.D. Yardley, Condition Monitoring : Engineering the Practice. Professional Engineering Publishing, UK, 2002.



# COURSE CODE : EEP 3753 COURSE NAME : PHOTOVOLTAIC SYSTEM & APPLICATIONS SISTEM FOTOVOLTAIK DAN APLIKASI

3 Credit Hours Pre-requisite : None

# Course Synopsis

This is an elective course aim to equip students with in-depth knowledge in solar energy and photovoltaics (PV) system. This course highlights the major power generation issues with the emphasis on the integration of various power management components such as energy security and green technology. At the beginning of the course, student will be exposed to the principles of solar and PV which includes components, parameters, standards and the principles of PV power generation. Furthermore, the students will be provide the tools, equipment's and the standard procedure which is involved in the PV system design, installation, testing, commissioning, maintenance and troubleshooting. At the end of the course, the students will be exposed to the various applications of PV power generation and the future potential as dominant green energy resources.

# Course Learning Outcomes

At the end of this course students should be able to:

- 1. Describe the principles of solar energy and photovoltaics (PV) system.
- 2. Distinguish and identify the various types of solar PV system configurations.
- 3. Design and analyze the basic solar PV power generation system

- 1. Deambi S. (2016) "Photovoltaic system design procedures, tools and applications". CRC Press, Taylor & Francis Group.
- 2. Hemami A. (2015) "Electricity and Electronics for Renewable Energy Technology: An Introduction". CRC Press, Taylor & Francis Group.
- 3. Kolisnychenko S. (2015) "Solar cells research and development of solar cells". Trans Tech Publications.
- 4. Shertukde, Madhusudan H. (2014) "Distributed photovoltaic grid transformers". CRC Press, Taylor & Francis Group.
- 5. Boxwell M. (2017) "Solar Electricity Handbook". 11th Edition. Greenstream Publishing
- 6. Sen Z. (2008). "Solar Energy Fundamentals and Modeling Techniques". 4th Edition. Springer
- 7. Ismail H. Altas. Adel M.S. (2014). "Solar Energy & PV Systems." 4th Edition. Hindawi Publishing
- 8. Ghassemi A. (2010). "Solar Energy: Renewal Energy and the Environment". 3rd Edition. CRC Press.



### COURSE CODE : EET 3503 COURSE NAME : DIGITAL COMMUNICATION KOMUNIKASI DIGITAL

3 Credit Hours Pre-requisite : None

# **Course Synopsis**

This course exposes student to the theory and practice of digital communications. Varieties of digital modulation system will be introduced; comparison on systems performance such as the usage of bandwidth and noise effect will be discussed. The course will model and study the effects of channel impairments such as the noise and distortion on the performance of communication systems; introduce signal processing, modulation, and coding techniques that are used in digital communication systems.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Determine modulation and optimum demodulation and detection methods and spread spectrum techniques for digital communications.
- 2. Evaluate critically the bit error rate of communication system when operating in AWGN environments.
- 3. Evaluate the performance of linear block and convolution codes in AWGN environments.

- 1. Skalar B., Digital Communication; Fundamental & Application, 2nd Edition, Prentice Hall, 2002
- 2. Leon W. & Couch, II, Digital and Analog Communication Systems, 7th Edition, Prentice Hall, 2007
- Haykin S., An Introduction to Digital and Analog Communications, 2nd Edition, Wiley, 2006
- 4. Proakis & Salehi, Communication Systems Engineering, 2nd Edition, Prentice Hall, 2002
- 5. Proakis J. G., Digital Communications, 4th Edition, McGraw-Hill, 2008



#### COURSE CODE : EET 3613 COURSE NAME : DIGITAL SIGNAL PROCESSING PEMPROSESAN ISYARAT DIGITAL

3 Credit Hour Pre-requisite : None

### **Course Synopsis**

This course provides knowledge and skills on key concepts, treatment of important issues in design, implementation and applications of digital signal processing theory and algorithms. Special emphasis is on the architectures and design techniques for digital filters. This course starts with a detailed examination of digital signal processing operations including sampling and reconstruction of continuous time signals, Nyquist sampling theorem, Fourier and z-transform. The Fourier and z-transforms will be used to analyze the stability of systems, and to find the system transfer function. The discrete Fourier transform (DFT) and fast Fourier transform (FFT) will be studied. Time and frequency domain techniques for designing and applying infinite impulse response (IIR) and finite impulse response (FIR) digital filters will be examined. Students will utilize MATLAB extensively in this course.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Explain fundamental concepts of fourier transform in signal processing, analog to digital conversion and digital to analog conversion.
- 2. Evaluate Z-transform, impulse and step response for typical first and second order filters, and combination of filters.
- 3. Evaluate DFT and inverse DFT using the definitions, Tables of Standard Transforms and Properties
- 4. Design FIR and IIR filters by hand and MATLAB to meet specific magnitude and phase requirements

- 1. John G. Proakis and Dimitris G Manolakis (2007) "Digital Signal Processing. 4th Ed". Pearson Prentice-Hall, Upper Saddle River New Jersey.
- 2. Syed Abdul Rahman al-Attas (2008) "Pemprosesan Isyarat Digit", Penerbit UTM Press



### COURSE CODE : EET 3623 COURSE NAME : ANTENNA AND RADIO PROPAGATION ANTENA DAN PERAMBATAN RADIO

3 Credit Hours Pre-requisite : None

# Course Synopsis

To introduce to the students, the concept of antenna and propagation in wireless communication system. The applications of Maxwell's Equations will be reviewed. The basic antenna properties such as gain, polarization, directivity, radiation pattern and efficiency for various types of antenna such as wideband antenna, microwave antenna and array antenna will be discussed. Students are also exposed to basic design of selected antenna types. Demonstrations on antenna measurement will be done at the laboratory. The concept of propagation in free space is discussed in detail such as space wave, sky wave and ground wave together with free space loss.

# **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Identify and classify the principles of antenna, types of antennas, matching concept, and types of wave propagations.
- 2. Apply the antenna theories, basic principles and its parameters to solve problems for various antenna designs.
- 3. Design and evaluate simple structure of antennas for simple applications.

- 1. Balanis, C. A., Antenna Theory, Analysis & Design, 4th Edition, John Wiley and Sons, 2016
- 2. Raju, G. S. N., Antennas and Wave Propagation., Pearson Education, 2006
- 3. Rappaport, T. H., Wireless Communications: Principle and Practice, 2nd Edition, Prentice Hall, 2008
- 4. Fusco, V. J., Foundation of Antenna Theory & Techniques, Pearson Prentice Hall, 2007
- 5. Saunders, S. R., Zavala, A. A., Antennas and Propagation for Wireless Communication Systems, John Wiley, 2007
- 6. Milligan, T. A., Modern Antenna Design, 2nd Edition, John Wiley, 2005


# COURSE CODE: EET 3633COURSE NAME: DATA COMMUNICATION AND MULTIMEDIA SYSTEM<br/>KOMUNIKASI DATA DAN SISTEM MULTIMEDIA

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This subject covers the fundamental of data communication, networks, and internet protocols. It explains the basic process of data communication, protocol, interfacing and internetworking between computer networks and switching components in telecommunication system. At the end of the course, the students should be able to understand the system used in representation, distribution, transmission and reception of data. As a hands-on skill of the application layer of ISO Model, the students are also given some skills on web server administration and web development.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Explain the concepts of data communication using layered approach based OSI and TCP/IP and their applications.
- 2. Analyze certain problems in data communication and perform the required solutions.
- 3. Synthesize, practice and maintain application layer OSI as web application.

- 1. Stallings, W., Data and Computer Communications, 7th Edition, Prentice Hall, 2000
- 2. Forouzan, B.A., Data and Computer Network, 5th Edition, McGraw Hill, 2013
- 3. Fitzgerald, J., Dennis, A., Fundamentals of Business Data Communications, 10th edition, 2010
- 4. Kurose, J.F., & Ross, K.W., Computer Networking, 4th Edition, Addison Wesley, 2008
- 5. Chapman, N., & Chapman, J., Digital Multimedia, 3rd Edition, John Wiley & Sons, 2009
- 6. Hallsall, F., Data Communication, Computer Network and Open System, 6th Edition, Addison Wesley, 1998



#### COURSE CODE : EET 3703 COURSE NAME : WIRELESS AND SATELLITE COMMUNICATION KOMUNIKASI WAYARLES DAN SATELIT

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course will introduce students to the broad field of wireless communications covering all types of wireless communications from satellite and cellular to local and personal area networks. Starting with the history, development and standardization, the basic concept of the system will also be discussed. This course also involves studies on leading-edge topics including Gigabit Wi-Fi, the Internet of Things, and 4G LTE-Advanced. The course conveys a focus on all aspects of wireless systems – wireless communication techniques, protocols and medium access control to form wireless networks.

#### **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Describe the basic principle of wireless mobile and cellular telephone system.
- 2. Analyze the propagation effect towards the wireles and cellular communication system design and access techniques.
- 3. Identify requirements for satellite communication system, path loss models and link budget requirements.

- 1. Beard, C. and Stallings, W. Wireless Communication Networks and Systems, 1st Edition, Pearson, 2016
- 2. Olenewa, J., Guide to Wireless Communication, 3rd Edition, Cengage, 2014
- 3. Rappaport, T.S, Wireless Communication, 2nd Edition, Prentice Hall, 2002
- 4. Pratt T., Bostian C., Allnutt J., "Satellite Communications, 2nd Edition.", Wiley 2003



#### COURSE CODE : EET 3713 COURSE NAME : ANTENNA ENGINEERING KEJURUTERAAN ANTENA

3 Credit Hours Pre-requisite : None

#### Course Synopsis

An introduction to design, analyse and optimization of antenna structures. Student will be given hands on opportunities to simulate several antenna types using 3D EM Software. The designed antennas will be analyzed for optimum antenna performance.

#### **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Understand the principles of antenna, types of antennas and matching concept.
- 2. Design, analyze and evaluate the matching network and the antenna structure to satisfy the desired requirement.
- 3. Design and optimize the antenna structure to satisfy the desired requirement and sustainable in wireless communication by using 3D EM simulation software.

- 1. Balanis, C. A., Antenna Theory, Analysis & Design, 4th Edition, John Wiley and Sons, 2016
- 2. Raju, G. S. N., Antennas and Wave Propagation., Pearson Education, 2006
- 3. Rappaport, T. H., Wireless Communications: Principle and Practice, 2nd Edition, Prentice Hall, 2008
- 4. Fusco, V. J., Foundation of Antenna Theory & Techniques, Pearson Prentice Hall, 2007
- 5. Saunders, S. R., Zavala, A. A., Antennas and Propagation for Wireless Communication Systems, John Wiley, 2007
- 6. Milligan, T. A., Modern Antenna Design, 2nd Edition, John Wiley, 2005



#### COURSE CODE : EET 3723 COURSE NAME : MICROWAVE ENGINEERING KEJURUTERAAN GELOMBANG MIKRO

3 Credit Hours Pre-requisite : None

#### Course Synopsis

An introduction to the design and analysis of active and passive RF and microwave circuits. Topics include RF microwave circuit analysis, measurement methods, transmission-line structures, matching networks, oscillators and mixers. Computer added analysis and design software will be introduced.

#### **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Explain and analyze transmission line circuits at RF passive and microwave frequencies.
- 2. Analyze the RF networks properties by using scattering parameter and solve transmission line problems by constructing network using the Smith Chart.
- 3. Design and evaluate the passive and active RF and microwave components that fulfill the desired specifications.

- 1. Pozar, D.M. Microwave Engineering 4th Edition, John Wiley & Sons, 2012
- 2. Grebennikov, A., RF and Microwave Transmitter Design, Wiley, 2011
- 3. Collin, R.E., Foundation for Microwave Engineering, 2nd Edition Mc-Graw Hill Inc., 2007
- 4. Ludwig, R., RF Circuit Design Theory and Application, 2nd Edition. Prentice Hall, 2008
- 5. Pozar, D.M., Microwave Engineering and RF Design of Wireless Systems, Wiley, 2001



#### COURSE CODE : EET 3733 COURSE NAME : INTRODUCTION TO RADAR PENGENALAN KEPADA RADAR

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

Learn the basic concepts of radar, how it works and applications and discover how target are received in angle, range and velocity. The radar range equation is developed in a form including signal integration, the effects of radar cross section (RCS), fluctuations, and propagation losses. Modern radar techniques are discussed for CW and pulse radars include pulse compressions, moving target indicator (MTI), and tracking radar systems. Radar Electronic Warfare is also introduced in this course.

#### **Course Learning Outcomes**

At the end of this course students should be able to:

- 1. Describe the fundamental principles of modern radar technology.
- 2. Evaluate radar equations and their parameters calculations.
- 3. Analyze radar parameters and their effects.

- 1. Merrill I. Skolnik, "Introduction to Radar Systems", McGraw-Hill, 2002.
- 2. J.C. Toomay, Paul J. Hannen, "Radar Principles for the Non-Specialist", SciTech Publishing,2004.



#### COURSE CODE : EET 3743 COURSE NAME : OPTICAL COMMUNICATION SYSTEM SISTEM KOMUNIKASI OPTIK

3 Credit Hour Pre-requisite : None

#### Course Synopsis

The course started with introduction to optical fiber technology and its application as line transmission. Student will learn about the key photonic devices that form the backbone of the optical communication system. These elements include optical fibers, light sources, photo detectors, passive optical devices, optical amplifiers etc. Starting from here, the optical communication is seen as a system and the students will learn how to design the system, including the ability to calculate and know how to decrease the noise.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Describe the theory of optical components and their application in the optical communication system.
- 2. Interpret basic concept of light propagation and analyze the transmission characteristics of optical fiber.
- 3. Design a fiber optic communication system.
- 4. Utilize equipment & engineering tools to evaluate optical fiber measurement
- 5. Communicate effectively through demonstration of work.

- 1. Gerd Keiser, Optical Fiber Communications, 3rd Edition, McGraw Hill, 2015
- 2. Palais, J.C., Fiber Optic Communication, 4th Edition. Prentice Hall, 2015
- 3. Powers, J., An Introduction to Fiber Optic Systems, 2nd Edition. McGraw Hill, 2005



#### COURSE CODE : EEC 3513 COURSE NAME : COMPUTER ARCHITECTURE AND ORGANIZATION SENIBINA DAN ORGANISASI KOMPUTER

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This course introduces machine language, computer architecture, data representations and aspects of distributed systems. Topics include conventional von Neumann architecture, the internal representation of data, instruction sets and formats, addressing, the fetch/execute cycle, memory architectures, and I/O architectures, as well as an overview of distributed, multiprocessor and parallel systems.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Apply data computation in modern computer.
- 2. Understanding of various issues and design in computer motherboard components.
- 3. Design and understanding of various memory and I/O systems and architectures.
- 4. Understanding of advanced topics of embedded systems and alternative computing architecture.

- 1. Stallings W., Computer Organization and Architecture: Designing for Performance, 10th Edition, Pearson, 2016
- 2. Murdocca M., Computer Architecture & Organization: An Integrated Approach, Wiley, 2007
- 3. Morris M., Computer System Architecture, 3rd Edition, Prentice Hall, 2007
- 4. Patterson, David A., Computer Organization & Design: The Hardware/ Software Interface, Morgan Kaufmann, 1998
- 5. Vranesic Z. G., Computer Organization, 5th Edition, McGraw-Hill, 2001



#### COURSE CODE : EEC 3703 COURSE NAME : ASIC DESIGN REKABENTUK ASIC

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This is a course in the field of Very Large Scale Integration (VLSI) circuit and systems design. Design and analysis of VLSI integrated circuits will be covered from a system design perspective. This course will focus exclusively on digital CMOS Application Specific Integrated Circuit (ASIC) systems design and automation. The ASIC physical design flow, including logic synthesis, floorplanning, placement, clock tree synthesis and routing will be presented. These back-end physical design flow steps will also be covered through hands-on practice using industrial VLSI CAD tools.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Appreciate the advanced concepts of modern VLSI circuit and system design, including differences between ASICs and FPGAs, standard cells, cell libraries, IPs etc.
- 2. Understand the back-end physical design flow, including floorplanning, placement, CTS and routing.
- 3. Understand the role of computer-aided design (CAD) tools in automating the design flow and providing improved productivity in VLSI systems design.

- 1. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, Digital Integrated Circuits: A Design Perspective. 2nd edition, Pearson Education India, 2016
- 2. John P. Uyemura, Introduction to VLSI Circuits and Systems: A Design Perspective, Prentice-Hall, Inc., 2002.
- 3. N. H. Weste and D. Harris, CMOS VLSI Design: A Circuits and Systems Perspective, Addison-Wesley, 2nd ed., 2004.
- 4. S.M. Kang and Y. Leblebici, CMOS Digital Integrated Circuits Analysis & Design, McGraw-Hill Inc., 2002
- 5. H. Bhatnagar, Advanced ASIC Chip Synthesis Using Synopsys Design Compiler Physical Compiler and PrimeTime, 2nd edition, 2001



#### COURSE CODE : EEC 3713 COURSE NAME : INTRODUCTION TO VLSI DESIGN PENGENALAN KEPADA REKABENTUK VLSI

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This is an introduction course to the design and layout of very large scale integrated (VLSI) circuits. Emphasis is put on the digital with some exposure on analog CMOS circuits. The focus will be on the systematic analysis and design of basic integrated circuits. Computeraided design (CAD) tools will be introduced for used in design, simulation, and layout of integrated circuits which will simultaneously assist them in increasing the creative skills needed to be applied in the field of Electronic Engineering.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Obtain the knowledge of fundamentals concepts of VLSI design principles and basic of integrated circuit technology.
- 2. Utilize computer-aided design (CAD) tools to construct integrated circuit design, simulation, verification, and layout subject to design rules and specifications.
- 3. Study, design and analyze the circuit characterization and performance in terms of device density, power consumption, delay and speed.
- 4. Use VLSI circuits to solve engineering problems.

- 1. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, Digital Integrated Circuits: A Design Perspective. 2nd edition, Pearson Education India, 2016
- 2. Wayne Wolf, Modern VLSI Design. 4th edition, Pearson Education India, 2008
- 3. Behzad Razavi, Design of Analog CMOS Integrated Circuits. 2nd edition, McGraw Hill Education, 2016
- 4. Sung-Mo Kang, Yusuf Leblebici, Chulwoo Kim, CMOS Digital Integrated Circuits Analysis & Design. 4th edition, McGraw-Hill Education, 2014
- 5. Neil H.E. Weste, David Harris, CMOS VLSI Design: A Circuits and Systems Perspective. 4th edition. USA: Pearson Education, 2010.



#### COURSE CODE : EEC 3723 COURSE NAME : EMBEDDED SYSTEM SISTEM TERBENAM

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This course will continue the bottom-up educational approach, started in earlier computing and programming course. The overall educational objective is to allow students to discover how the computer interacts with its environment. It will provide hands-on experiences of how an embedded system could be used to solve EE problems. The focus will be understanding and analysis rather than design. The analog to digital converter (ADC) and digital to analog converter (DAC) are the chosen mechanism to bridge the CE and EE worlds. EE concepts include Ohms Law, LED voltage/current, resistance measurement, and stepper motor control. CE concepts include I/O device drivers, debugging, stacks, FIFO queues, local variables and interrupts. The hardware construction is performed on a breadboard. Software is developed in ARM Cortex-M assembly and C. Software debugging occurs during the simulation stage. Verification occurs in both stages.

Topics to be covers include, embedded systems; machine language execution; assembly and C language programming; local variables and subroutines; input/output synchronization; analog to digital conversion and digital to analog conversion; debugging; and interrupts.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Understanding of the role of embedded systems and embedded software programming.
- 2. Grasp the concepts and principles, and be familiar with the approaches and methods of developing embedded system;
- 3. Apply the knowledge and techniques learnt to develop solutions to real-world problems;
- 4. Organize and manage embedded system for deployment and demonstration.

- 1. Valvano, Jonathan. Introduction to Embedded System, UT Austin Press. 2019.
- 2. Valvano, Jonathan. Embedded Systems: Introduction to Arm® Cortex™-M Microcontrollers, 5ed, UT Austin Press. 2019.
- 3. Yi Feng, Zhu. Embedded Systems with ARM Cortex-M Microcontrollers in Assembly Language and C, 3ed, 2017.
- 4. Xiao, Perry. Designing Embedded Systems and the Internet of Things (IoT) with the ARM mbed, Wiley, June 2018.
- 5. Unsalan, Cem. Embedded Digital Control with Microcontrollers: Implementation with C and Python, Wiley, 2021.



### COURSE CODE : EEC 3733 COURSE NAME : SOFTWARE DESIGN AND IMPLEMENTATION REKABENTUK PERISIAN DAN PELAKSANAAN

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course is an intermediate to advanced course on computer programming. It covers concepts of object oriented programming, algorithm and data structure and design patterns. There will be implementations and practical on a chosen framework. Students will be given mathematical, engineering or IT problems to be solved using a ready-made chosen framework as well as to create their own framework.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Understand the concepts of object oriented programming.
- 2. Understand the concepts of design pattern.
- 3. Understand the basic algorithms and data structures and using it from the implemented framework.
- 4. Be able to implement their own framework to target a mathematical, engineering or IT problems.

- 1. Mark. J. Price, C# 8.0 and .NET Core 3.0, 4th edition, Packt Publishing, Birmingham, UK, 2019
- 2. Narashimha Karumanchi, Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles, 5th edition, CareerMonk Publications, Hyderabad, India, 2016
- 3. Tony Gaddis, Starting out with Visual C#, 5th edition, Pearson, 2019



#### COURSE CODE : EEC 3743 COURSE NAME : COMPUTER SECURITY KESELAMATAN KOMPUTER

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This is an introduction course to computer security overview. It covers several topics such as security basics overview, model and policy. This is followed by basic cryptography and network security protocol, management and E-commerce issues. Then student is introduced to system design issues and information assurance covering design principles, security mechanisms, auditing, risk analysis and system verification and evaluation. Furthermore, the student will be exposed to topic on intrusion detection and response such as attack classification, vulnerability, detection, containment and standard response/recovery. At the end of the course, students are exposed to relevant legal and ethical issues covering local and international demand including imposed restriction and digital rights.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Explain the basic concept of computer security general overview, definition, security model and policy
- 2. Apply the fundamental concept of cryptography
- 3. Describe the importance of network principles and architecture to security operation.
- 4. Explain the system design issues and information assurance
- 5. Explain and classify malicious attacks, threats and intrusion for detection, impact on system infrastructure and standard response.
- 6. Describe information security standards, compliance laws, and security policy.

- 1. Matt Bishop, Computer Security: Art and Science, 2nd edition, Addison-Wesley, 2019
- 2. William Chuck Easttom, Computer Security Fundamentals, 4th edition, Pearson, 2020
- 3. Ross J. Anderson, Security Engineering: A Guide to Building Dependable Distributed Systems, 3rd edition, Wiley, 2020



#### COURSE CODE : EEC 3753 COURSE NAME : ARTIFICIAL INTELLIGENCE KECERDASAN BUATAN

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This course introduces the student to various intelligent system and their applications in computer system operation. Specific intelligent systems mainly the artificial neural network, machine learning and support vector machine will be discussed in detail. Students are also required to develop mini projects that involve the development of an intelligent system for solving complex engineering problems.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Discuss the fundamental concepts, characteristics and methodologies of intelligent systems.
- 2. Understand the working principle of various intelligent techniques.
- 3. Apply an artificial intelligence system and machine learning techniques for solving complex engineering problem.

- 1. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach (4th Edition), Pearson, 2020.
- 2. A. Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems 2nd Edition, O'Reilly Media, 2019.
- 3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
- 4. P.C. Jackson, Introduction to Artificial Intelligence: Third Edition, Dover Publications, 2019.
- 5. C. C. Aggarwal, Neural Networks and Deep Learning: A Textbook, 1st edition, 2018.



#### COURSE CODE : EEN 3703 COURSE NAME : SOLID-STATE ELECTRONIC DEVICES PERANTI ELEKTRONIK KEADAAN PEPEJAL

3 Credit Hours Pre-requisite : None

#### Course Synopsis

The course is intended for undergraduate electrical engineering students in updating their understanding of modern electronics. This course introduces semiconductor fundamentals and applications to the electronic devices. In addition, it also provides the background in the physics of the compound semiconductor-based electronic devices. Topics include the background solid state and semiconductor physics, and basic principles of electronic devices operation.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Understand the basic physics of semiconductor electronic devices.
- 2. Explain basic principles of electronic devices operation.
- 3. Understand the internal workings of the most basic solid state electronic devices.

- 1. Ben Streetman; Sanjay Banerjee (2015), Solid State Electronic Devices, 7th Edition, Pearson.
- 2. Papadopoulos, Christo (2014). Solid-State Electronic Devices: An Introduction. Springer-Verlag New York
- 3. M. Razeghi, , (2009) Fundamentals of Solid State Engineering , 3rd ed., Springer.

# COURSE CODE : EEN 3713 COURSE NAME : NANOELECTRONIC DEVICE FABRICATION AND CHARACTERIZATION FABRIKASI DAN PENCIRIAN PERANTI NANOELEKTRONIK

3 Credit Hours

Pre-requisite : None

#### **Course Synopsis**

This course is designed to provide students with a basic understanding of the fabrication and characterization processes of nanoelectronic device that grasped current research attention. Nanoelectronic devices have potential benefit for various purposes such as in the electronic industry itself and also in health and medical breakthroughs. The scope of the course mainly discusses the fundamental of each step in fabrication processes and the characterization processes required in fabricating a functioning nanoelectronic device. This course will cover the material selection, fabrication and characterization process in the fabrication of the nanoelectronic device and their potential application in microelectromechanical systems and health and medical equipment.

#### **Course outcomes**

Upon completion of this course, students are able to:

- 1. Explain the fundamental fabrication processes of nanoelectronic devices.
- 2. Identify appropriate characterization methods required for the fabrication of the nanoelectronic devices.
- 3. Discuss and perform a critical analysis of related research literature for suitable fabrication and characterization processes for a selected end product related to nanoelectronic devices.

- 1. M. J. Madou, Fundamentals of Microfabrication and Nanotechnology Volume II Manufacturing Techniques for Microfabrication and Nanotechnology, CRC Press, 2011.
- 2. L. H. Madkour, "Nanoelectronic Materials Fundamentals and Applications," Springer, 2019.
- 3. B. Y. Majlis, "MEMS and Lab on Chip: Interfacing Macro to Nano World," in 2013 IEEE Regional Symposium on Micro and Nanoelectronics (RSM 2013), 2013, p. VII.



#### COURSE CODE : EEN 3723 COURSE NAME : ELECTRONIC MATERIALS BAHAN ELEKTRONIK

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course explain the main concept of electronic material approach on electrical, optical, and magnetic properties of materials including semiconductors, metals, organics, and insulators. Detail how devices are built to take advantage of these properties will be covered. This is illustrated with a wide range of devices, placing a strong emphasis on new and emerging technologies.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Solve problems in material science and technology using the appropriate principles.
- 2. Analyze the appropriate concepts learned about material.
- 3. Demonstrate the ethical values and professionalism character in completing the given task.

- 1. R.E. Hummel, Electronic Properties of Materials, Springer-Verlag, 3rd edition, 2001.
- 2. J. W. Mayer and S. S. Lau, Electronic Materials Science: for Integrated Circuits in Si and GaAs, Macmillan, 1990.
- 3. Rainer Waser, "Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices", Wiley-VCH, 2003.



#### COURSE CODE : EEN 3733 COURSE NAME : NANOTECHNOLOGY AND APPLICATIONS TEKNOLOGI NANO DAN APLIKASI

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course is designed to provide students with basic understanding of nanotechnology that has many potential benefits in electronic devices, energy savings, alternative energy supplies, efficient use of raw materials, environmental protection, agriculture applications and medical breakthroughs. The scope of the course mainly discusses the fundamental of nanotechnology and its impact on society, unique properties of nanostructured materials, nanomaterials synthesis methods and its characterization techniques, nanotechnology applications as well as the safety, social and ethical issues in nanotechnology.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Explain the fundamental principles of nanotechnology and their applications.
- 2. Identify and compare state-of-the-art nanomaterials synthesis methods and perform a critical analysis of the research literature.
- 3. Discuss and evaluate state-of-the-art characterization techniques for nanomaterials, and determine nanomaterial safety and handling methods required during characterization.

- 1. B.S. Murty, P. Shankar, B. Raj, B. B. Rath, J. Murday, Nanoscience and Nanotechnology, Springer-Verlag Berlin Heidelberg, 2013.
- 2. D. Newberry, Nanotechnology Past and Present, Morgan & Claypool Publishers, 2020.
- 3. Y. Dahman, Nanotechnology and Functional Materials for Engineers, Elsevier-Health Sciences Division, 2017.



# COURSE CODE : EEN 3743 COURSE NAME : MICROELECTRONICS RELIABILITY & FAILURE ANALYSIS ANALISIS KEBOLEHPERCAYAAN DAN KEGAGALAN MIKROELEKTRONIK

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This course provides knowledge about the factors that affect the reliability and failure of microelectronics. The course covers general understanding on the most common materials, structures, manufacturing methods and failure mechanisms of typical electronic components, packages, devices and the need for necessary electrical design aspects for reliability.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Describe various processes for reliability testing, life time prediction methods and physics of failure analysis.
- 2. Analyze reliability testing and failure mechanisms at different interconnection and packaging levels.
- 3. Propose design for reliability methodologies to promote robust package design

- 1. M. Ohring and L. Kasprzak, Reliability and Failure of Electronic Materials and Devices, Academic Press, 2011.
- 2. R. J. Ross, Microelectronics Failure Analysis : Desk Reference, ASM International, 2011.
- 3. P. L Martin, D. D. Dylls, N. K. Medora, I. L. May, L. L. Ludwig, Electronic Failure Analysis Handbook : Techniques and Applications for Electronic and Electrical Packages, Components, and Assemblies, Mc-Graw Hill, 1999.



#### COURSE CODE : EEB 3703 COURSE NAME : BIOMEDICAL INSTRUMENTATION INSTRUMENTASI BIOPERUBATAN

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This course will present an overview of the fundamental principles and applications of biomedical instrumentations and sensors. An overview of the current state of the art will highlights on aspects of electrical and electronic circuits, bioelectrodes, biopotentials and neural stimulation. By the end of the course you should understand various measurement devices and techniques, including the underlying biological processes that generate the quantities to be measured or controlled.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Explain the relevance of the electrical engineering theories related to bioelectric phenomena and neural stimulation.
- 2. Identify the different physical principles which govern the measurement of a physiological signals.
- 3. Demonstrate the capability in conducting a multidisciplinary project related to the development of various biomedical instruentation devices.

- 1. John G. Webster and Amit J. Nimunkar, Medical Instrumentation: Application and Design, 5th Edition, John Wiley & Sons, 2020.
- 2. Andrew G. Webb, Principles of Biomedical Instrumentation, Cambridge University Press, 2018
- 3. Raghbir S. Khandpur, Handbook of Biomedical Instrumentation, 3rd Edition, McGraw-Hill Education, 2014



#### COURSE CODE : EEB 3713 COURSE NAME : BIOMEDICAL IMAGE PROCESSING PEMPROSESAN IMEJ BIO-PERUBATAN

3 Credit Hours Pre-requisite : None

#### **Course Synopsis**

This course is designed to provide fundamental knowledge in Biomedical imaging and its analysis. Biomedical imaging and analysis are fundamental to understanding, visualizing, and quantifying medical images in clinical applications. Disease diagnosis will be easier and faster by applying automated and quantitative image analysis techniques. This will also lead to significant development in medicine in general. The goal of this course is to help students develop skills in digital image processing and machine learning/deep learning techniques applied to biomedical image analysis. This course will cover the following topics:

- Basics of Radiological Image Modalities and their usage
- Medical Image Computing, toolkits and Deep Learning
- Medical Image Registration, Segmentation, and Visualization
- Machine Learning and Deep Learning in Medical Imaging
- NeuroImaging: fMRI, DTI, MRI, Connectome.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Explain the major processes involved in formation of medical images.
- 2. Identify the advantages and disadvantages of various image processing and analysis techniques for medical images.
- 3. Demonstrate the capability in applying the suitable methods in solving problems as a group project.

- 1. Paul Suetens, Fundamentals of Medical Imaging, Cambridge University Press; 3rd edition, 2017.
- 2. Isaac Bankman, Handbook of Medical Image Processing and Analysis, Academic Press; 2nd edition, 2008.
- 3. Jerry L. Prince and Jonathan Links, Medical Imaging Signals and Systems, Pearson, 2nd edition, 2015.
- 4. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, Pearson, 4th edition, 2018.



#### COURSE CODE : EEB 3723 COURSE NAME : CELL, BIOMATERIAL, AND TISSUE ENGINEERING SEL. BIOBAHAN DAN KEJURUTERAAN TISU

3 Credit Hours Pre-requisite : None

#### Course Synopsis

This course is designed to provide a fundamental knowledge of cells, tissue engineering, extracellular matrix, biomaterials and scaffold in tissue engineering, in vitro and in vivo strategies for development of bio-artificial organs, clinical applications of tissue engineering and ethical and regulatory issues in tissue engineering.

#### **Course Outcomes**

At the end of this course students should be able to:

- 1. Explain the relevance of the extracellular matrix and its interaction with materials for development of bio-artificial organs.
- 2. Identify the different applications of tissue engineering and bionics.
- 3. Demonstrate the capability in conducting a multidisciplinary project related to the development of bio-artificial organs.

- 1. Robert Lanza, Robert Langer, Joseph P. Vacanti, Anthony Atala, Principles of Tissue Engineering, Academic Press; 5th edition, 2020.
- 2. Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemons, Biomaterials Science: An Introduction to Materials in Medicine, Academic Press; 3rd edition, 2012.
- 3. Azizi Miskon, Primary hepatocytes and mesenchymal stem cell culture experiments: a way towards bioartificial organs, Penerbit UTHM, 2014.



#### COURSE CODE : EEB 3733 COURSE NAME : ARTIFICIAL INTELLIGENT AND MACHINE LEARNING KEPANDAIAN BUATAN DAN PEMBELAJARAN MESIN

3 Credit Hours

Pre-requisite : None

#### **Course Synopsis**

To introduce the basic concepts, theories and state-of-the-art techniques of artificial intelligence, and in particular, machine learning. To give students practical insights into the current development of the field. Students will learn the basic concepts and fundamental principles in lectures. More examples how to solve problems will be demonstrated in tutorials to help students have a deeper understanding of the teaching materials. Students will work on assignments to enhance the understanding of learning principles, and acquire hands-on experience on a mini project.

#### **Course outcomes**

Upon completion of this course, students are able to:

- 1. Explain the capabilities, strengths and limitations of various artificial intelligence and machine learning techniques. C4
- 2. Explain various AI and machine learning algorithms and their applications and describe learning models and algorithms. A4
- 3. Apply selected AI and machine learning algorithms to solve real problems. P6

- 1. Simon O. Haykin, Neural Networks and Learning Machines, 3rd, Pearson, 2008.
- 2. Phil Kim, MatLab Deep Learning with Machine Learning, Neural Networks and Artificial Intelligence, 2017.
- 3. Russell & Norvig, Artificial Intelligence: A Modern Approach 2nd, Prentice Hall, 2018.



#### COURSE CODE : EEB 3743 COURSE NAME : OPTOELECTRONIC OPTOELEKTRONIK

3 Credit Hours

Pre-requisite : -

#### **Course Synopsis**

This course is designed to provide students with introduction of combined technologies of optics and electronics or known as optoelectronics. Electronic devices that emit or detect optical or near-optical radiation are called optoelectronic components such as lasers, photocells, beam splitters and optical fibers where introduction is done through qualitative explanations to allow the understanding of concepts before analytical development which includes vectors, complex numbers and partial differentiation. The scope covers but not limited to wave nature of light, dielectric waveguides and optical fibers and stimulated emission devices. The applications include lighting, communications, sensing and control.

#### **Course outcomes**

Upon completion of this course, students are able to:

- 1. Explain the fundamental concepts of optoelectronics.
- 2. Provide explanation that concerned with electronic device utilization to sourcing, detection and control of light.
- 3. Identify optoelectronic components and how they function to provide for future applications.

- 1. S.O.Kasap, Optoelectronics and Photonics, Pearson, 2013.
- 2. John P. Dakin, Robert G.W Brown, Handbook of Optoelectronics, concepts, devices, and technique, CRC Press, 2017
- 3. D. Birtalan and W.Nunley, Optoelectronics Infrared Visible Ultraviolet Devices and Applications, CRC Press, 2009.



# AERONAUTICAL ENGINEERING & AVIATION DEPARTMENT

# PROGRAM INTRODUCTION BACHELOR OF AVIATION (ZK61)

This programme is to fulfil the aspiration of Royal Malaysian Air Force (RMAF) to produce pilots with Bachelor Degree in Aviation at a younger age of 23 years old. The program is a joint effort programme between the RMAF and Universiti Pertahanan Nasional Malaysia (UPNM). This mutual relationship will promote strategic relationship between both parties which will exploit further collaboration and sharing of facilities, industrial knowledge and expertise in defence and security especially in military aviation.

This programme will also support the aspiration of Ministry of Higher Education (MOHE) in providing alternative learning platform by utilizing the concept of 2u2i to produce students with holistic and balance knowledge of academic and industry. This is based on the First Shift (Holistic, Entrepreneurial and Balanced Graduates) and Fourth Shift (Quality TVET graduates) of Malaysia Education Blueprint 2015 – 2015 (Higher Education) where students will be exposed under the Work-based Learning (WBL) concept to get them equipped with industry aware and industry ready attributes.

In line with 2u2i concept, UPNM is the first Institute of Higher Learning (IHL) in Malaysia that offers such unique programme. This programme will be delivered in the university (Academic phase) for 2 years and the rest will be implemented in Flying Institutes at Air Force College (KTU) (Industrial Phase). The curriculum is designed to give students the opportunity to acquire Bachelor of Aviation with extensive academic background to complement military aviation requirements. In general, the programme covers good breadth of underlying science and technology related to aircraft systems and flying practical.

#### **OBJECTIVES AND EDUCATION OUTCOMES**

The aim of Bachelor in Aviation is to support Royal Malaysia Air Force's aspirations to enhance the academic qualification of the pilots graduated from the Air Force College (Kolej Tentera Udara – KTU) flying institute and to obtain younger pilots whom are fresh intake from Foundation level.

#### **Programme Educational Objectives (PEO)**

- PEO 1. Graduates adapt to working environment through effective teamwork, leadership, and communication in aviation field.
- PEO 2. Graduates demonstrate knowledge and competency in command and operation in aviation field.
- PEO 3. Graduates portray an ethical responsibility and continuously engage in personal and professional growth with regards in aviation field.

#### **Programme Learning Outcomes (PO):**

At the end of the programme, graduates will be able to:

- PO1: Acquire and apply knowledge in multi-disciplinary fields related to aviation and management.
- PO2: Apply practical skills and techniques in related domain.
- PO3: Evaluate and analyse problems critically and provide sensible solution using appropriate tools and techniques.
- PO4: Communicate, express and articulate findings in written and oral forms effectively.
- PO5: Establish responsible decisions, positive relationship and effective team work to handle challenging situations effectively in societal and environmental contexts for sustainable development.
- PO6: Recognize and apply ethical standards of values, ethics and professionalism in their professional work.
- PO7: Recognize the needs for continuing professional development especially in respective domain.
- PO8: Apply managerial and entrepreneurial skills and qualities in respective domain.
- PO9: Function effectively as individual and as a leader in diverse team and multi-disciplinary environment.

#### **AERONAUTICAL ENGINEERING AND AVIATION DEPARTMENT**

#### **Associate Professor**

Lt Kol Ir. Khalid bin Abd Jalil TUDM KAT, P.Eng, MIEM (Bersara) B.Sc. (Mech.) (HanYang, Korea), Master in Aviation Safety & Airworthiness (ENSICA/ENCA, Toulouse)

Lt Kol Ir. Nurulhasnan bin Abdul Majid TUDM P.Eng, MIEM (Bersara) B.Sc. (Aero.Engr) (Texas), (M.Sc.) (UNSW)

Lt Kol Tarmizi bin Ahmad (Bersara) B.Sc (Hons) (Aeronautical Eng) (Surrey), M.Sc (Aerodynamics-Applied Flight Mechanics) (Cranfield)

#### **Senior Lecturer**

Mej Nurul Izzah Hidayah L.C. Lim binti Abdullah TUDM B.Eng (Mech) (UTM), M.Sc. (Aircraft Structure) (ISAE Toulouse, France)

Lt Kdr Norzaima binti Nordin TLDM B.Eng (Mech-Aero) (UTM), M.Sc. (Aerodynamics) (ISAE Toulouse, France)

Dr. Gunasilan A/L Manar

B. Eng. (Mech)(UTM), M.Sc in Aerospace Mechanics and Avionics (ISAE, Toulouse, France) Advanced Master in Aeronautics and Aerospace Structure (ISAE, France) PhD in Applied Mechanics and Mechanics of Materials (ISAE, France)

Dr. Norazrina binti Mat Jali

B.Eng (Hons) (Metallurgical Eng.) (UniMAP),MSc (Chemical & Process Eng.) (UKM),MSc (Aerospace Mechanics and Avionics) (ISAE SUPAERO,France) PhD (Applied Mechanics and Mechanics of Materials) (ISAE SUPAERO,France)

#### Lecturer

Kapt Zuhairi bin Abdul Rashid B.Eng. Electrical-Electronic (UTM) M.Sc. Aeronautical and Space System (ISAE-Supaero, Toulouse)

Baizura binti Bohari B.Eng. (Aero) (UPM), MSc Aerospace Technology (University of Sussex), Advance Master in Aeronautical Mechanics and Avionics (ISAE-Supaero, Toulouse)

Shaiful Hakim bin Mohamed Noor Dip. Eng. in Thermal & Energy (Montluçon), B.Eng in Aeronautical Maintenance (Lieusaint) M.Sc in Aerospace Propulsion Engineering (Nanterre)

#### AERONAUTICAL ENGINEERING AND AVIATION DEPARTMENT

#### Air Force College

**Commandant** Brig Jen Dato' Muhammad Tarminzi bin Hj Mustapha TUDM

# Officer Commanding of Administration

Lt Kol Yusnizam bin Abd Zain TUDM

#### **Training Officer**

Lt Muhammad Syafiq bin Abdullah TUDM

#### **College Warrant Officer**

WO I Mohd Shahril bin Mohd Salleh

# No 1 Flying Institute

#### **Commanding Officer**

Lt Kol Mohd Faizal bin Md Jani TUDM

**Executive Officer** Mej Mohamad Zaini bin Zainorin TUDM

# Standard Safety and Readiness Officer

Mej Mohd Hafiz bin Jamaludin TUDM

#### Instructors

Mej Saizulazmil binti Abd Manan TUDM Mej Mohd Syamsul bin Mohd Yusop TUDM Mej Mohamad Azha bin Mohamad Yamin TUDM Mej Mohd Nurhazizi bin Abd Halim TUDM Mej Timhar bin Naufal TUDM Mej Mohd Iqbal bin Mohd Yunus TUDM Mej Zul Helmie bin Zainuddin TUDM

# No 2 Flying Institute

**Commanding Officer** Mej Bahaizil bin Mohd Bakar TUDM

# Executive Officer

Mej Abdul Hadi Jamal bin Abd.Nasir TUDM

# **Standard Safety and Readiness Officer**

Mej Mohd Nazree bin Mansor TUDM

#### Instructors

Mej Noor Fazdli bin Ahmad TUDM Mej Rozniza binti Abd Kadir TUDM Mej Mohd Asmil Faiq TUDM Mej Abdul Hadi bin Jamal Abd Nasir TUDM Mej Rozaidi bin Kasim TUDM Mej Norkhairil Hazaliezam bin Zakaria TUDM Mej Noremazuan bin Nordin TUDM

# **Officers Training School**

**Commanding Officer** Lt Col Muazam Shah bin Mohd Yusof TUDM

#### **Chief Instructor**

Mej Mohd Zairul Hisham bin Muhamad Ibrahim TUDM

Head Of Standards Division Mej Mohd Idham bin Ibrahim TUDM

Head Of Training Divison Mej Zeti Haryani binti Ismail TUDM

**Head Of Curriculum Division** Mej Zarizal bin Idris TUDM

Adjutant Kapt Mohd Muqlis bin Badrul Hisham TUDM

#### Head of Training Assistance Division

Lt Rosnani binti Ab. Rahman TUDM

Head of Management Cell

Lt Mohd Rudaini bin Hamzah

# COURSE STRUCTURE AND TOTAL CREDIT REQUIREMENT FOR THE PROGRAM OF BACHELOR OF AVIATION (ZK61)

Duration of the program is 4 years with 2 years in university (2u) and 2 years in industry (2i). During the 2u phase, the program will run in 4 semesters as with other mainstream program with 14 weeks every semester, 1 week of exam revision week and 3 weeks of exam period. During the 2i phase, the program will run in Work-Based Learning (WBL) environment throughout the whole 2 years and the conducted in module form where examination will be held after completion of each module accordingly. The components of the programme and their respected credit value are shown below:

COURSE	CREDIT		
	2u (University)	2i (Industry)	
University Courses: i. University Core ii. University Elective	24 6	-	
Program Core Courses: i. Program Core	30	20	
Program Elective Course (Technical Specialization)	12	30	
Total (2u & 2i)	72	50	
TOTAL CREDIT FOR GRADUATION	12	22	

# LIST OF PROGRAM CORE BACHELOR OF AVIATION (ZK61)

Following are the list of core program need to be completed during academic and industry phase (48 credits):-

Code	Course	Credit
	Algebra and Trigonometry	2
EFA 3203	Algebra and Thgonometry	3
EVA 3303	Statics and Dynamics	3
EVA 3313	Introduction to Electrical and Electronics	3
EFA 3273	Calculus	3
EVA 3383	Thermofluids	3
EVA 3333	Introduction to Flight	3
EVA 3343	Flight Mechanics	3
EVA 3353	Aircraft Structure and System	3
EVA 3363	Aircraft Power Plant	3
EVA 3373	Aircraft Avionics and Instrumentation	3
EVV 3903	Basic Military Training	3
EVV 3913	Service Knowledge	3
EVV 3922	Leadership	2
EVV 3932	Navigation and Fields	2
EVV 3953	Beginner Ground School	3
EVV 3962	Intermediate Ground School	2
EVV 3973	Advanced Ground School	3

# LIST OF ELECTIVE PROGRAM (TECHNICAL SPECIALIZATION) BACHELOR OF AVIATION (ZK61)

List of courses for elective program (technical specialization) during academic phase (12 credits)

Code	Course	Credit	Code	Course	Credit
*Elective: M	anagement Domain				
TMM 3283	Human Resources Management	3	DMR 3363	Financial Management and Accounting	3
TMM 3293	Management Theory and Practice	3	DMR 3343	Organisational Behaviour	3

Code	Course	Credit	Code	Course	Credit
*Elective: Co	omputing Domain				
TST 3213	Computer Organisation and Architecture	3	TST 3233	Computer Network	3
TSP 3213	Fundamentals of Programming	3	TSP 3223	Object-oriented Programming	3

Code	Course	Credit	Code	Course	Credit	
*Elective: Logistic Domain						
DMR 3763	Supply Chain for Logistic	3	DMM 3733	Integrated Logistics Support	3	
DMM 3933	Principles of Accounting	3	TML 3333	Military Logistics	3	

Code	Course	Credit	Code	Course	Credit
*Elective: Av	viation Domain				
EVE 3703	Flight Control	3	EVE 3723	Occupational	3
				Safety and Health	
				in Aviation	
EVE 3713	Introduction to Aircraft	3	EVE 3733	Aviation Management	3
	Maintenance			and Security	

\* All elective courses should be selected from the same domain.

FIRST YEAR - COURSEWORK MODE (2U)								
SEMESTER 1			SEMESTER 2					
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE	
			University C	ore Courses				
LLF 3XX1	Foreign Language I	1	-	LLF 3XX1	Foreign Language II	1	-	
LLA 3XX1	Foreign Language I	AUDIT	-	LLA 3XX1	Foreign Language II	Audit	-	
LLE 3012	English for Academic Writing	2	-	LLE 3032	Al-Ghazali Dialogue: English Comm	2	-	
MPU 3142	Philosophy and Currents Issues	2	-	MPU 3132	Appreciation of Ethics and Civilizations	2	-	
DUS 3022	Introduction to Strategic Studies	2	-	MPU 3312	Nationhood	2	-	
DUS 3012	Military History	2	-					
	<u> </u>		University Ele	ective Course	s			
				ALK 3112	General Military Training I	2	-	
			Faculty Co	re Courses				
EFA 3263	Algebra and Trigonometry	3	-	EFA 3273	Calculus	3	-	
			Program C	ore Courses				
EVA 3303	Statics and Dynamics	3	-	EVA 3383	Thermofluids	3	-	
EVA 3313	Introduction to Electrical and Electronics	3	-	EVA 3333	Introduction to Flight	3	-	
т	OTAL	18		-	TOTAL	18		

	SECOND YEAR - COURSEWORK MODE (2U)								
	SEMEST	ER 3		SEMESTER 4					
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE		
			University (	Core Courses					
DUM 3022	Military leadership	2	-	DUS 3032	Military Law and Law of Arm Conflict	2	-		
MPU 3412	Human Movement Science	2	-	MPU 3212	Entrepreneurship	2	-		
			University El	ective Course	es				
ALK 3122	General Military Training II	2	-	QKS 3172	Unarmed Combat	2	-		
	1	1	Faculty Co	ore Courses		1	1		
			Program C	ore Courses					
EVA 3343	Flight Mechanics	3	-	EVA 3363	Aircraft Power Plant	3	-		
EVA 3353	Aircraft Structure and System	3	-	EVA 3373	Aircraft Avionic and Instrumentation	3	-		
			Program Ele	ective Course	S				
XXX 3XX3	* Elective I	3	-	XXX 3XX3	* Elective III	3	-		
XXX 3XX3	* Elective II	3	-	XXX 3XX3	* Elective IV	3	-		
Т	OTAL	18			TOTAL	18			

Note: Student must pass all courses offered during the academic phase in order to continue their study in the industrial phase.

\* Refer list of elective program.

During Industrial Mode (2i), the program will run in Work-Based Learning throughout the whole 2 years (year 3 and year 4) and the program will run in module form where examination will be conducted after completion of every module.

THIRD YEAR - INDUSTRIAL MODE (2i)								
	SEMESTER 5 -	- PHASE 1			SEMESTER 6 -	PHASE 2		
	6 MONT	HS			4 MONT	HS		
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE	
			University C	Core Courses				
			University Ele	ective Courses	; 			
			_					
	1	1	Program C	ore Courses	1	T		
EVV 3903	Basic Military Training	3	-	EVV 3942	Survival	2	-	
EVV 3913	Service Knowledge	3	-	EVV 3953	Beginner Ground School	3	-	
EVV 3922	Leadership	2	-	EVV 3962	Intermediate Ground School	2	-	
EVV 3932	Navigation and Field	2	-	EVV 3973	Advanced Ground School	3	-	
Т	OTAL	10		Т	OTAL	10		

Note: (Semester 5 - phase I)

- 1. Student must pass all courses in *Mod Pengajian Kerja Kursus* (2u) with minimum CGPA 2.70 in order to register in Phase I, semester 5.
- 2. Pass all courses with minimum mark 60%.
- 3. Student must pass all courses offered during semester 5 in order to continue their study in Phase II, semester 6.
- 4. Student will be considered fail during this semester if they did not meet the requirements i.a.w MPPLU TCI by RMAF.

Note: (Semester 6- phase II)

- 1. Pass all courses with minimum mark 75%.
- 2. The credit for EVV 3942 will not be used for CGPA calculation.
- 3. Student must pass all courses offered during Phase II, semester 6 in order to continue their study in Phase III, semester 7.
- 4. Student will be considered fail during this semester if they did not meet the requirements i.a.w MPPLU TCI by RMAF.

FOURTH YEAR - INDUSTRIAL MODE (2i)								
SEMESTER 7 – PHASE III **ELECTIVE TRACK FIXED WING				SEMESTER 8 – PHASE III **ELECTIVE TRACK ROTARY WING				
16++ MONTHS								
CODE	COURSE	CREDIT	PRE- REQUISITE	CODE	COURSE	CREDIT	PRE- REQUISITE	
			University C	ore Courses				
		1	University Ele	ctive Courses		1		
			Program Co	ore Courses				
Basic Flying Semester 7			Basic Flying Semester 7					
EVF 3707	Fixed Wing Pre Flight Preparation	7	-	EVR 3807	Rotary Wing Pre Flight Preparation	7	-	
EVF 3711	Fixed Wing Basic Flying	11	-	EVR 3811	Rotary Wing Basic Flying	11	-	
Advance Flying Semester 8		Advance Flying Semester 8						
EVF 3726	Fixed Wing Intermediate Flying	6	-	EVR 3826	Rotary Wing Intermediate Flying	6	-	
EVF 3736	Fixed Wing Advanced Flying	6	-	EVR 3836	Rotary Wing Advanced Flying	6	-	
Т	OTAL	30		Т	OTAL	30		

\*\* Elective track will be set by the RMAF

Note:

- 1. Pass all courses with minimum mark 75% (theory) and 65% (Practical).
- 2. Student must pass all courses in Phase III, semester 7 and 8 consecutively.
- 3. Student who fail during phase III can be consider for non-flying elective credit (30 credits) subject to MAF approval.
- 4. Student will be considered fail during Phase III, semester 7 and 8, if they did not meet the requirements i.a.w MPPLU TCI by RMAF.
# CORE COURSES SYNOPSIS BACHELOR OF AVIATION (ZK61)

COURSE CODE COURSE NAME : EFA 3263 : ALGEBRA AND TRIGONOMETRY ALJABAR DAN TRIGONOMETRI

3 Credits Pre-requisite : None

#### **Course Synopsis**

This course is designed to introduce the fundamental of mathematics to students with particular emphasis on basic concepts of number system, equations, inequalities, absolute value, polynomials, sequences and series, matrices, trigonometry, limits and continuity, differentiation, and applications of differentiation. The main objective of this course is to provide basic conceptual understanding of basic mathematics principles for subsequent related programs.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Describe basic operations and mathematical terms involved in mathematics.
- 2. Use the formula involved and mathematical operations in basic algebra and calculus.
- 3. Solve the equations of functions in basic algebra and calculus.

- 1. Ong Beng Sim, Lee Khaik Yong, Yong Zulina Zubairi, Maheran Nuruddin, Che Noorlia Noor & Miskiah Dzakaria. 2012. Mathematics for Matriculation Semester 1.4th ed. Oxford Fajar Sdn. Bhd.
- 2. Dr. Ch'ng Pei Eng, Cheng Siak Peng, Ch'ng Pei Cheng & Dr. Ng Set Foong. 2013. Matriculation Mathematics 1 for Sciences Students. 4th Ed. Oriental Academic Publication.
- 3. Howard Anton, Irl C. Bivens & Stephen Davis. 2012. Calculus. 10th ed. Wiley.

#### COURSE CODE : EVA 3303 COURSE NAME : STATICS AND DYNAMICS STATIK DAN DINAMIK

3 Credits Pre-requisite : None

# **Course Synopsis**

This subject can be divided into two parts: Statics and Dynamics. Statics deals with equilibrium of bodies, i.e., bodies that are at rest or moving with constant velocity. Students are exposed to the topics on resultant and resolution of forces, equilibrium of a particle, and equilibrium of rigid bodies, centre of gravity and centroid, and moment of inertia of an area. Meanwhile Dynamics explores topics concerned with the accelerated motion of bodies. Students are exposed to the finer details of kinematics and kinetics of particles and rigid bodies. Kinematics of particles and rigid bodies discusses the relationship between displacement, velocity and acceleration against time. Kinetics of particles and rigid bodies will expose the concepts of force and acceleration (Newton's second law of motion), energy and work, and impulse and momentum.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Define and formulate the state of equilibrium of a particle and a rigid body and use the equations of equilibrium to solve problems involving the equilibrium of a particle and of a rigid body applying the concepts of resultant and resolution of forces and the concept of moment of a force and moment of a couple.
- 2. Analyse the effect of friction and to calculate the centre of gravity and centroid of a body, and the moment of inertia of an area.
- 3. Describe the relationships between displacement, velocity and acceleration against time and able to use such relationships to solve problems involving motions of a particle.
- 4. Apply Newton's second law of motion to establish relationship between force, acceleration and utilized principle of work, energy and the principle of impulse and momentum to solve problems involving kinetics of particle.

- 1. Hibbeler, R. C. (2016). Engineering Mechanics Statics. 14 th Ed. SI. Singapore: Prentice Hall.
- 2. Hibbeler, R.C. (2016). Engineering Mechanics Dynamics. 14 th Ed. SI. Singapore: Prentice Hall.
- 3. Beer, F.P and Johnson, E.R., Vector Mechanics for Engineers Statics and Dynamics, 12<sup>th</sup> Edition, SI, Singapore: McGraw Hill, 2018

# COURSE CODE: EVA 3313COURSE NAME: INTRODUCTION TO ELECTRICAL AND ELECTRONICSPENGENALAN KEPADA ELEKTRIK DAN ELEKTRONIK

3 Credits Pre-requisite : None

#### **Course Synopsis**

This course will provide students with an understanding of the electric and electronics components, an introduction to related theorem and law which are fundamentals in describing electric and electronic circuits. It will emphasis on current flow and voltage analysis and their relations in solving problems related with both direct current and alternating current circuits. The Ohm's law and Kirchhoff's law will be discussed throughout this course as this two laws is a compulsory in understanding the electrical and electronics related problems.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the basic principles, definitions and theories in electrical and electronics circuits.
- 2. Apply the basic principles of electrical and electronics in solving related problems
- 3. Analyse problems related to electrical and electronics

- 1. David A Bell. Electronic Devices and Circuits, Oxford Higher Education, 5th Edition, 2008.
- 2. Patil. Basic Electronic Devices and Circuits, PHI Learning, 1st Edition, 2013.
- 3. John O'Malley. Schaum's Outline of Basic Circuit Analysis, McGraw Hill, 2nd Edition, 1992.

COURSE CODE : EFA 3273 COURSE NAME : CALCULUS KALKULUS

3 Credits Pre-requisite : None

#### **Course Synopsis**

This course has been designed to extend the ideas of single-variable calculus (example: functions, differentiation, integration and vector functions) to functions of several variables. Topics include multivariable functions, partial derivatives, local extrema, absolute extrema, Lagrange multipliers, double integrals, triple integrals, vector functions, scalar fields, vector fields, line integrals, Green's theorem, surface integrals, Stoke's theorem and Gauss's theorem.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the characteristics of multivariable functions.
- 2. Apply standard procedures to determine the partial derivatives to find extremum values.
- 3. Apply appropriate procedures to determine integral in Cartesian, polar, cylindrical and spherical coordinates by using multiple integrals.
- 4. Solve various problems in scalar and vector fields by using appropriate theorems.

- 1. Santos, D. A., & Musa, S. M. (2015). Multivariable and Vector Calculus: An Introduction. Stylus Publishing, LLC.
- 2. Ron Larson, Bruce Edwards. Calculus of a Single Variable, Brooks/Cole Cengage Learning, 10th Edition, 2017
- 3. Franks Ayres Jr., Elliott Mendelson. Schaum's Outlines of Calculus, Mc Graw Hill, 6th Edition, 2015

#### COURSE CODE : EVA 3383 COURSE NAME : THERMOFLUIDS TERMO BENDALIR

3 Credits Pre-requisite : None

## **Course Synopsis**

Thermofluid is a branch of science and engineering, covering topics in thermodynamics and fluid mechanics. These topics form the basic foundations that govern processes in engineering applications. This course is an introduction to the thermofluid and how the principles can be applied to understand/design thermal and fluid flow processes. In thermodynamics, students are exposed to the basic concept of thermodynamic, thermodynamic properties, first law and second law of thermodynamics. Meanwhile in Fluid Mechanics, students will expose to basic concept of fluid, fluid properties, fluid in static and fluid dynamic including Bernoulli principle and external flow (Drag & Lift) which are related to the real application in aviation.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain basic principles, definitions and theories in all topics as given in the lecture contents and syllabus
- 2. Apply the principle of thermofluids in solving engineering problems
- 3. Analyze the thermofluids problems in related topics

- 1. Y.A Cengel and M.A Boles, *Thermodynamics: An Engineering Approach*, 9<sup>TH</sup> Edition, 2019 McGraw Hill- Eduction.
- 2. Yunus A Chengel. & J.M. Cimbala, Fluid Mechanics Fundamental and Applications, McGraw Hill International Edition, 3rd Edition in SI Units, 2014.
- 3. Munson, Young, and Okiishi. 2013. Fundamental of Fluid Mechanics. 7th Ed. Singapore: John Wiley and Sons.
- 4. M.J. Moran and H.N. Shapiro, *Fundamentals of Engineering Thermodynamics*, Wiley.

# COURSE CODE : EVA 3333 COURSE NAME : INTRODUCTION TO FLIGHT PENGENALAN KEPADA PENERBANGAN

3 Credits Pre-requisite: None

#### **Course Synopsis**

Students will pursue knowledge and understanding of flight history, basic aerodynamics, low speed subsonic flow, aircraft wings and aerofoil technology, and aircraft performance. The knowledge of the flight technology is important for all potential pilots where they will be able to demonstrate the ability to understand the mechanics of flight during the actual flying phase.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Describe knowledge of aviation history and basic aviation technologies.
- 2. Explain the basic Aerodynamics, basic Flow Equations, Wing and Aerofoil Technology, and Aircraft Performance
- 3. Apply knowledge, techniques and tools in the fundamental of Aviation Technology in solving related problems

- 1. Anderson, J.D. (2016), Introduction to Flight, 8th Edition, Singapore: McGraw-Hill Higher Education.
- 2. DOLE, C.E. and LEWIS, J.E. (2000), Flight Theory and Aerodynamics: A Practical Guide for Operational Safety, 2nd edition, Singapore: McGraw-Hill Higher Education.

## COURSE CODE : EVA 3343 COURSE NAME : FLIGHT MECHANICS MEKANIK PENERBANGAN

3 Credits Pre-requisite: None

## **Course Synopsis**

This course will provide students with an understanding of the flight mechanics and its related principles including the reference system and basic aerodynamics. Student will also be enhance with the proper knowledge of flight mechanics in lateral and longitudinal flight. At the end of the course, student will be able to understand and apply the knowledge of flight mechanics that applied in the actual aircraft.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain basic principles, definitions and theories of a reference system.
- 2. Apply related theorem in flight physics and flight mechanics.
- 3. Analysed and model flight mechanics of an aircraft in lateral and longitudinal flight.

- 1. John D. Anderson, Jr. Introduction to Flight, McGraw Hill, 8th Edition, 2016.
- 2. Thomas R Yechout. Introduction to Aircraft Flight Mechanics: Performance, Static Stability, Dynamic Stability, Classical Feedback Control, and State-Space Foundations (AIAA Education), American Institute of Aeronautics and Astronautics, 2nd Edition, 2014.
- 3. M. V. Cook, Flight Dynamics Principles, Butterworth-Heinemann, 2013.
- 4. Warren F Phillips, Mechanics of Flight, Wiley, 2nd Edition, 2012.

# COURSE CODE : EVA 3353 COURSE NAME : AIRCRAFT STRUCTURE AND SYSTEM STRUKTUR DAN SISTEM PESAWAT

3 Credits Pre-requisite: None

#### **Course Synopsis**

This course introduces students to the aircraft structure and system. The student is expected to understand the behaviour of aircraft structural parts on ground and mainly during flight. Students will be exposed to the metallic and non-metallic such as composites used in aeronautical applications. Aircraft systems such as flight control systems, hydraulics systems, and pressurization and ventilation system will be taught in this course.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the principles of aircraft structure.
- 2. Describe the systems equipped on the aircraft.
- 3. Analyse and solve engineering problems related to aircraft structure and systems.

- 1. T.H.G. Megson (2016). Aircraft Structures for Engineering Students, 6th Edition. Elsevier Ltd.
- 2. Ian Moir, Alan Seabridge, Aircraft Systems: mechanical, electrical, and avionics subsystem integration 3rd Edition John Wiley and Sons 2008.
- 3. Pilots Handbook of Aeronautical Knowledge.
- 4. Lombardo, David A, Aircraft Systems 2nd Edition. McGraw-Hill, 1998 John Wiley and Sons.

## COURSE CODE : EVA3363 COURSE NAME : AIRCRAFT POWER PLANT SISTEM JANAKUASA PESAWAT

3 Credits Pre-requisite: None

#### **Course Synopsis**

This course will provide students with basic knowledge and understanding about the construction and the operation of various types of aircraft power plant. It will emphasize on the basic theory of heat and fluid flow, electrical power generation, hydraulics, air pressure generation, lubrication system, engine performance, type of turbine engines, engine installation and it sub-components. It gives students integration of information on how individual components and systems operate together.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain basic principles, definitions and theories in aircraft power plant.
- 2. Apply the principle and function of the aircraft power plant to its related systems
- 3. Evaluate the overall system of an aircraft power plant.

- 1. Kores & Wild (2013), Aircraft Powerplants (7th Edition) Mc-Graw Hill (ISBN:9780028018744)
- 2. El-Sayed A. F (2008), Aircraft Propulsion & Gas Turbine Engines, CRC Press (ISBN: 0-8493-9196-2)
- 3. Anderson J. D (1999), Aircraft Performance & Design, Mc-Graw Hill (ISBN: 0-07-116010-8)
- 4. Anderson J. D (1999), Introduction to Flight, Mc-Graw Hill (ISBN: 0-07-100496-3)

# COURSE CODE: EVA 3373COURSE NAME: AIRCRAFT AVIONICS AND INSTRUMENTATIONAVIONIK DAN INSTRUMENTASI PESAWAT

3 Credits Pre-requisite : None

# **Course Synopsis**

In principle, this course can be divided into 2 parts: aircraft avionics and flight instrumentation. Aircraft avionics deals with all the electronic system used on board an aircraft. Avionic systems will covers the sub-system of communication system, navigation system, monitoring system, aircraft flight control system, collision avoidance system, flight recorders, weather systems as well as aircraft management systems. On the other hand, flight instrumentation are the instrument in the cockpit that provide the pilot/co-pilot/navigator with the relevant information about the flight situation on that aircraft which will improve the safety while flying. Both of these parts are mostly integrated together in the cockpit which normally displayed by electronic flight information system which consist of primary flight display, multi-function display and engine indicating and crew alerting system. All of these system in being implemented by having multiple redundancy to ensure safety for the crew and aircraft.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. To describe basic flight avionic and instrumentation subsystem independently.
- 2. To appraise each aircraft avionics and instrumentations system accordingly.
- 3. To assess each system as an integrated unit in terms of its priorities and proposed solutions based on its significance.

- 1. Moir, Ian and Seabridge, Allan, 2011, "Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration". John Wiley & Sons.
- 2. S. Nagabhushana & L.K.Sudha, 2010, "Aircraft Instrumentation and System". I.K. International Ovt Ltd.
- Tolley, Mike and Wyatt, David, 2017, "Aircraft Communications and Navigation Systems".
   2nd Ed. Routledge.

## COURSE CODE : EVV 3903 COURSE NAME : BASIC MILITARY TRAINING LATIHAN ASAS KETENTERAAN

3 Credits Pre-requisite: None

#### **Course Synopsis**

This course will provide students with an understanding of physical fitness and endurance, drill in RMAF, and weapon handling. Throughout this course, student will develop their basic physical fitness accordance to military standard as well as develop their knowledge and skill toward military drill and weaponry. This course is done continuously to ensure a consistence development is achieve. Student will undergo a practical assessment for physical fitness, drill and weaponry which will test both their knowledge of theory and skills.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the basic knowledge required for every military officers.
- 2. Display good understanding on weapon handling and firing skill.

- 1. PU 9503 009 Latihan Ketenteraan Perkhidmatan Udara 2017.
- 2. MD 0.3.7 TD The Army Physical Training (PROVOSIONAL) 2003.
- 3. MM 0.3.7A TD Kawad Istiadat (SEMENTARA) 2009.
- 4. MM 0.3.8A TD Kawad Untuk Semua Pasukan (SEMENTARA) 2009.
- 5. PU 9208 Manual Latihan Menembak TUDM.
- 6. MU 720-1761-100-00-50 Nota Kursus Senjata Kecil.

# COURSE CODE : EVV 3913 COURSE NAME : SERVICE KNOWLEDGE PENGETAHUAN PERKHIDMATAN

3 Credits Pre-requisite: None

#### **Course Synopsis**

This course will provide student with an understanding of basic service knowledge in RMAF. Throughout this course, student will enhance their knowledge in RMAF history and organisation including safety implementation and service correspondence. Student will also enhance their skill in writing and managing service account as well handling law related cases in order for them to be competence as an officer in RMAF workplace environment. Additional to that, student will be exposes to the air power concept and air warfare.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Apply general service knowledge of RMAF culture, process and procedure.
- 2. Comprehend safety aspect including processes and procedures in RMAF.
- 3. Apply military law knowledge in aspect of discipline management in RMAF.
- 4. Demonstrate writing skill and technique in accordance with MAF JP 0.0.1
- 5. Demonstrate accounting skill and technique in maintaining service account.
- 6. Describe air power concept in RMAF.

- 1. PU 9503 009 Latihan Ketenteraan Perkhidmatan Udara 2017.
- 2. PU 9104 001 Safety Management.
- 3. PU 9104 002 Flight Safety.
- 4. PU 9104 003 Guideline for Occupational Safety and Health.
- 5. Armed Forces Act 1972 Amended (1996).
- 6. Armed Forces (Field Punishment) Regulation 1976.
- 7. Armed Forces (Board of Inquiry) Rules 1976.
- 8. Armed Forces (Summary Jurisdiction) Regulation 1976.
- 9. Armed Forces (Imprisonment and Detention) Rules 1976.
- 10. Armed Forces (Court Martial) Rules of Regulation 1976.
- 11. Evidence Act 1950. 12. PU 2882 Panduan Lembaga Penyiasatan.
- 13. MAF JP 0.01 Malaysian Armed Forces Staff Manual (Service Writing) 2009.
- 14. MP 7.3.2A TD Pengurusan Akaun Perkhidmatan (SEMENTARA) 2009.
- 15. Air Power Doctrine 4th Edition.
- 16. Air Operation Planning Process.

# COURSE CODE : EVV 3922 COURSE NAME : LEADERSHIP KEPIMPINAN

2 Credits Pre-requisite : None

#### **Course Synopsis**

This course will provide student with theory and practical instruction covering concepts, principles and procedures associate with managerial, leadership and communication. Generally, this course covers the skill and character development essential for RMAF officers to play their role effectively.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Display teamwork skills and principles appropriate to RMAF culture and environment.
- 2. Explain the military regimental activities, procedures and etiquettes.
- 3. Apply principles, skills and techniques of leadership in military environment.

- 1. PU 9503 009 Latihan Ketenteraan Perkhidmatan Udara 2017.
- 2. PU 5201 Pengurusan Fasilitas Mess dan Kelab.
- 3. PU 5204 Peraturan Pakaian TUDM.
- 4. RMAF Officer's Guide.
- 5. Buku Nota PIFA Tahap 5 Kor Agama Angkatan Tentera.
- 6. Panduan Pendidikan Moral dan Etika ATM.

## COURSE CODE : EVV 3932 COURSE NAME : NAVIGATION AND FIELD PANDU ARAH DAN LAPANGAN

2 Credit Hours Pre-Requisite: None

#### **Course Synopsis**

This course will provide student with knowledge and skills in land navigation or orientating of traversing through unfamiliar terrain by foot. Land navigation include the ability to read maps, use compass and other navigational skill. This course is an essential part of military training. Often these courses need student to travel several miles long in rough terrain and are performed under adverse conditions such as night and in the rain. Another part of this course is a basic survival course where it is design for student to learn how a solder survive in harsh outdoor condition. This course will also provide student with knowledge in military tactics especially in camouflaging and movement. Additionally, student will be learning on how to treat common outdoor type injuries and trauma in remote area using practical methods.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Demonstrate ability to work in group especially in field exercise.
- 2. Follows the step and procedure in compass marching and survival.
- 3. Display ability to lead troops in field exercise.

- 1. PU 9503 009 Latihan Ketenteraan Perkhidmatan Udara 2017.
- 2. Buku Nota Ikhtiar Hidup TUDM.

## COURSE CODE : EVV 3942 COURSE NAME : SURVIVAL IKHTIAR HIDUP

2 Credits Pre-requisite: None

## **Course Synopsis**

This course will provide survival skills that are important for every military personnel especially in the case of isolation with limited resources. The isolation can occur in swamp, jungle or sea area where each area is different in term of sources and environment. Survival skill is technique that a person may use in order to sustain life in any type of natural environment. This course will provide techniques that are meant to provide basic necessity for human life which include water, food and shelter. This course will also provide the skill that support proper knowledge and interaction with animal and plant to promote the sustaining of life over a period of time. Additionally, student will be introduce with dinghy drill which is an evacuation technique to evacuate oneself from a sinking aircraft cabin.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Display ability to work in group during all surviving phase.
- 2. Perform knowledge and skill related to survival theory and practical.
- 3. Organise troop during survival activities.

- 1. PU 9503 009 Latihan Ketenteraan Perkhidmatan Udara 2017.
- 2. Buku Nota Ikhtiar Hidup TUDM.
- 3. Rules and regulation for examination refer to Buku Peraturan Akademik UPNM.
- 4. PU 9206 Command Training Instruction (2nd Edition). SLP Unit Training Instruction.
- 5. PU 5102 Manual Training Policy and Procedure RMAF.

## COURSE CODE : EVV3953 COURSE NAME : BEGINNER GROUND SCHOOL ASAS PENERBANGAN – TAHAP I

3 Credit Hours Pre-requisite: None

#### **Course Synopsis**

This course will provide students with an understanding of the basic the knowledge on the military aviation and pre-flying training preparation topics such as Aviation Meteorology Theory, Meteorology Practical, Radio Theory and Aircraft Instruments. The delivery of this module will be via theory lessons in the classroom and practical demonstrations and exercises in the actual aircraft or simulator (FTD) as and when required.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Understand and explain the basic principles and theories in the Aviation Meteorology and communication
- 2. Apply the theories in the Meteorology practical related problems
- 3. Understand and describe the basic principles and theories in Radio system

- 1. Flight Operations Surveillance Inspector Manual, DCA, 2015.
- 2. Manual of Instrument Flight Procedure Design, DCA, 2013.
- 3. Curriculum Basic Aviation Knowledge Course, PU 1505-001 dated 09 Apr 2008.
- 4. The Civil Aviation Regulation (CAR), P.U. (A) 139/96, 1996.
- 5. Aeronautical Information Publication, Malaysia. Aeronautical Information Services, Department of Civil Aviation. Putra Jaya.
- 6. Royal Air Force Manual of Flying, Vol 1-9, AP 3456, Royal Air Force UK, 1995.
- 7. ATPL Ground Training Series, 4th Edition, Oxford Aviation Academy (UK) Limited, 2008..



# COURSE CODE : EVV 3962 COURSE NAME : INTERMEDIATE GROUND SCHOOL ASAS PENERBANGAN – TAHAP II

2 Credits Pre-requisite : BEGINNER GROUND SCHOOL

## **Course Synopsis**

This course will provide students with an understanding of the basic the knowledge on the military aviation and pre-flying training preparation topics such as Basic Aerodynamics, Air Law, Navigations and, Flight Safety and Airmanship. The delivery of this module will be via theory lessons in the classroom and practical demonstrations and exercises in the actual aircraft or simulator (FTD) as and when required.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Understand and explain the basic principles and theories in Basic Aerodynamics
- 2. Describe the basic principles and theories in Air Law
- 3. Understand and describe the basic principles and theories in Flight Safety and Airmanship.

- 1. Basic Aerodynamics For Aviation Maintenance; EASA Module 08, Aircraft Technical Book Company LLC (2016)
- 2. Curriculum Basic Aviation Knowledge Course, PU 1505-001, 09 Apr 2008.
- 3. The Civil Aviation Regulation (CAR), P.U. (A) 139/96, 1996.
- 4. Aeronautical Information Publication, Malaysia. Aeronautical Information Services, Department of Civil Aviation. Putra Jaya.
- 5. Royal Air Force Manual of Flying, Vol 1-9, AP 3456, Royal Air Force UK, 1995.
- 6. Principles of Flight, ATPL Ground Training Series, 4th Edition, Oxford Aviation Academy (UK) Limited, 2008

## COURSE CODE : EVV 3973 COURSE NAME : ADVANCED GROUND SCHOOL ASAS PENERBANGAN – TAHAP III

3 Credits
Pre-requisite : INTERMEDIATE GROUND SCHOOL II

# **Course Synopsis**

This course will provide students with an understanding of the basic the knowledge on the military aviation and pre-flying training preparation topics such as Human Performance and Limitation, Aircraft System General Technical knowledge, Aircraft Loading and Aircraft Performance (PC7/PC7 Mk II). The delivery of this module will be via theory lessons in the classroom and practical demonstrations and exercises in the actual aircraft or simulator (FTD) as and when required.

## **Course outcomes**

At the end of the course students will be able to:

- 1. Apply the basic principles and theories in Human Performance and Limitations
- 2. Practically apply the basic principles in Human Performance and Limitations
- 3. Explain the general technical knowledge of aircraft system and aircraft loading (P2)

- 1. Loss of Control Prevention and Recovery Training, EASA, 2017.
- 2. Curriculum Basic Aviation Knowledge Course, PU 1505-001, 09 Apr 2008.
- 3. The Civil Aviation Regulation (CAR), P.U. (A) 139/96, 1996.
- 4. Aeronautical Information Publication, Malaysia. Aeronautical Information Services, Department of Civil Aviation. Putra Jaya.
- 5. Royal Air Force Manual of Flying, Vol 1-9, AP 3456, Royal Air Force UK, 1995.
- 6. Principles of Flight, ATPL Ground Training Series, 4th Edition, Oxford Aviation Academy (UK) Limited, 2008.

# ELECTIVE CORE COURSES SYNOPSIS (TECHNICAL SPECIALIZATION) (FIXED WING COURSES) BACHELOR OF AVIATION (ZK61)

# COURSE CODE : EVF 3707 COURSE NAME : FIXED WING PRE-FLIGHT PREPARATION PERSEDIAAN PRA-PENERBANGAN SAYAP KAKU

7 Credits

Pre-requisite : Must pass all module at phase II

## **Course Synopsis**

The course provides training in theoretical and applied techniques of flying for student pilots in order for them to be able to undertake operational roles on selected aircraft of the RMAF or other services upon graduation. The students will learn about the technical systems equipped on the aircraft. Besides, they will learn on how to handle the emergencies and prepare themselves with pre-flight checklists.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the process and procedures with regard to RMAF organisation and pre-flight knowledge.
- 2. Display good understanding on pre-flying preparation exercises.
- 3. React and respond effectively to RMAF chain of command and standards.
- 4. Integrate oneself with the culture, ethics and professionalism of RMAF.

- 1. Publikasi Udara Tentera Udara DiRaja Malaysia PU 1502 001, 2017.
- 2. Standard Operating Procedures Pilatus PC-7 Mk II, Kolej Tentera Udara, 2017.
- 3. AP 3456 Royal Air Force Manual of Flying, Vol. 1 -9, Air Ministry 1995.
- 4. Oxford Aviation Academy Series 1-14, 2011.
- 5. Chief Of Airforce Directive Flying, April 2004.
- 6. PC-7 MkII Students's Study Guide.
- 7. Aircrew Flight Manual PC-7 MkII.

#### COURSE CODE : EVF 3711 COURSE NAME : FIXED WING BASIC FLYING PENERBANGAN SAYAP KAKU – TAHAP I

11 Credit Hours Pre-requisite: Must pass EVF 3707

# **Course Synopsis**

The course provides training in theoretical and applied techniques of basic general flying for student pilots in order for them to be able to undertake operational roles on selected aircraft of the RMAF or other services upon graduation. The students will learn progressively from straight and level flight up to aerobatics performance. The effectiveness of this course will be enhanced by the using of flight training device.

# **Course Outcomes**

At the end of this course students will be able to:

- 1. Apply theory and skills in manoeuvre and control the aircraft under normal conditions.
- 2. Demonstrate theory and skills in manoeuvre and control the aircraft under normal conditions.
- 3. Respond to handle the established emergency drills in a timely and correct manner.
- 4. Adapt to condition with regards to communication between other parties involve during flight.

- 1. Publikasi Udara Tentera Udara DiRaja Malaysia PU 1502 001, 2017.
- 2. Standard Operating Procedures Pilatus PC-7 Mk II, Kolej Tentera Udara, 2017.
- 3. AP 3456 Royal Air Force Manual of Flying, Vol. 1 -9, Air Ministry 1995.
- 4. Oxford Aviation Academy Series 1-14, 2011.
- 5. Chief Of Airforce Directive Flying, April 2004.
- 6. PC-7 MkII Students's Study Guide.
- 7. Aircrew Flight Manual PC-7 MkII.

#### COURSE CODE : EVF 3726 COURSE NAME : FIXED WING INTERMEDIATE FLYING PENERBANGAN SAYAP KAKU – TAHAP II

6 Credits Pre-requisite: Must pass EVF 3711

## **Course Synopsis**

This course is introduce as the continuity of the previous course. Flying skills will be enhanced with instrument flying and basic navigation elements. Human performance and limitations also will be taught in this course

The students will be exposed to human performance and limitation with practical in flight training device.

## Course Outcomes

At the end of this course students will be able to:

- 1. Display ability to fly the aircraft with flight instruments using correct techniques and Instrument Flight Rules (IFR) procedure.
- 2. Demonstrate flight and mission planning and able to navigate the training aircraft competently under day time conditions to the limits of the aircraft's safe range
- 3. Demonstrate capability to adapt with rules and regulation related to flying.

- 1. Publikasi Udara Tentera Udara DiRaja Malaysia PU 1502 001, 2017.
- 2. Standard Operating Procedures Pilatus PC-7 Mk II, Kolej Tentera Udara, 2017.
- 3. AP 3456 Royal Air Force Manual of Flying, Vol. 1 -9, Air Ministry 1995.
- 4. Oxford Aviation Academy Series 1-14, 2011.
- 5. Chief of Airforce Directive Flying, April 2004.
- 6. PC-7 MkII Students's Study Guide.
- 7. Aircrew Flight Manual PC-7 MkII.

# COURSE CODE : EVF 3736 COURSE NAME : FIXED WING ADVANCED FLYING PENERBANGAN SAYAP KAKU – TAHAP III

6 Credits Pre-requisite : Must pass EVF 3726

## **Course Synopsis**

This course is introduced as the final phase of the flying phase. Advanced part of the flying such as close formation, night flying, advanced navigation, tactical flying and advanced general flying will be taught during the course. At the end of this course, the students need to undergo Final Handling Test to complete all the training.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Demonstrate manoeuvre and control the aircraft safely and competently under day time and night time conditions throughout the normal spectrum of the training aircraft operating envelope with advanced navigation.
- 2. Display and adapt tactical flying skills with advanced general flying.
- 3. Perform tactical flying with regard to military requirement.

- 1. Publikasi Udara Tentera Udara DiRaja Malaysia PU 1502 001, 2017.
- 2. Standard Operating Procedures Pilatus PC-7 Mk II, Kolej Tentera Udara, 2017.
- 3. AP 3456 Royal Air Force Manual of Flying, Vol. 1 -9, Air Ministry 1995.
- 4. Oxford Aviation Academy Series 1-14, 2011.
- 5. Chief Of Airforce Directive Flying, April 2004.
- 6. PC-7 MkII Students's Study Guide.
- 7. Aircrew Flight Manual PC-7 MkII.

# ELECTIVE CORE COURSES SYNOPSIS (TECHNICAL SPECIALIZATION) (ROTARY COURSES) BACHELOR OF AVIATION (ZK61)

# COURSE CODE : EVR 3807 COURSE NAME : ROTARY WING PRE-FLIGHT PREPARATION PERSEDIAAN PRA-PENERBANGAN HELIKOPTER

7 Credits Pre-requisite : Must pass all module at phase II

Course Synopsis

This course is introduced as an introductory level for potential helicopter pilot, EC 120B. The students will be exposed to General Service Training, Principle of Flight, Aircraft Technical, Performance and Checklist, Order & Instructions, Check ABC and Mountain Flying Knowledge. Most of the subject will further enhance in the next flying phase.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the process and procedures with regard to RMAF organisation and pre-flight knowledge.
- 2. Display good understanding on pre-flying preparation exercises.
- 3. React and respond effectively to RMAF chain of command and standards.
- 4. Integrate oneself with the culture, ethics and professionalism of RMAF.

- 1. Publikasi Udara Tentera Udara DiRaja Malaysia PU 1504 016, September 2015.
- 2. EC 120B Flight Manual, Eurocopter June 2010.
- 3. EC 120B Standard Operating Procedure, Kolej Tentera Udara 2017.
- 4. Kolej Tentera Udara Flying Order Book, June 2017.
- 5. Chief of Airforce Directive Flying, April 2004.
- 6. RMAF Principle of Flight.
- 7. Oxford Aviation Academy Book, 2011.
- 8. EC 120B Student Study Guide, January 2017

# COURSE CODE : EVR 3811 COURSE NAME : ROTARY WING BASIC FLYING PENERBANGAN HELIKOPTER – TAHAP I

11 Credit Hours Pre-requisite: Must pass EVR 3807

## **Course Synopsis**

This course introduce student for basic helicopter flying. The student will be expose how to handle the aircraft in normal and emergency condition following all the rules and regulation stipulated by the RMAF. Most of the subject will further enhance in the next advance flying phase.

Basic Flying consist General Handling sorties by simulation and actual. Assessment is done on completion of every element (sortie) by individual instructors. At the end of this course, the student will assess by examiner in Basic Handling Test (BHT). Student must pass all the written exam and 3 practical assessment before entering intermediate flying phase.

## **Course Outcomes**

At the end of this course students will be able to:

- 1. Apply theory and skills in manoeuvre and control the aircraft under normal conditions.
- 2. Demonstrate theory and skills in manoeuvre and control the aircraft under normal conditions.
- 3. Respond to handle the established emergency drills in a timely and correct manner.
- 4. Adapt to condition with regards to communication between other parties involve during flight.

- 1. Publikasi Udara Tentera Udara DiRaja Malaysia PU 1504 016, September 2015.
- 2. EC 120B Flight Manual, Eurocopter June 2010.
- 3. EC 120B Standard Operating Procedure, Kolej Tentera Udara 2017.
- 4. Kolej Tentera Udara Flying Order Book, June 2017.
- 5. Chief of Airforce Directive Flying, April 2004.
- 6. RMAF Principle of Flight.
- 7. Oxford Aviation Academy Book, 2011.
- 8. EC 120B Student Study Guide, January 2017.

## COURSE CODE : EVR 3826 COURSE NAME : ROTARY WING INTERMEDIATE FLYING PENERBANGAN HELIKOPTER – TAHAP II

6 Credits Pre-requisite: Must pass EVR 3811

## **Course Synopsis**

This course introduced student to instruments and advance flying of helicopter. The student will be exposed how to handle an aircraft in Instrument Meteorological Condition (IMC) solely with reference to the instrument. Student also will be exposed handling the aircraft towards operational flying requirement.

Intermediate Flying consist of dual Instrument Flying sorties and Advance General Handling sorties by simulation and actual. Assessment is done on completion of every element (sortie) by individual instructors. At the end of Instrument Flying Phase, the students will assess by examiner in Instrument Flying Test (IFT). Student must pass all the practical assessment before entering advance flying phase.

# **Course Outcomes**

## At the end of this course students will be able to:

- 1. Display ability to fly the aircraft with flight instruments using correct techniques and Instrument Flight Rules (IFR) procedure.
- 2. Demonstrate flight and mission planning and able to navigate the training aircraft competently under day time conditions to the limits of the aircraft's safe range
- 3. Demonstrate capability to adapt with rules and regulation related to flying.

- 1. Publikasi Udara Tentera Udara DiRaja Malaysia PU 1504 016, September 2015.
- 2. EC 120B Flight Manual, Eurocopter June 2010.
- 3. EC 120B Standard Operating Procedure, Kolej Tentera Udara 2017.
- 4. Kolej Tentera Udara Flying Order Book, June 2017.
- 5. Chief of Airforce Directive Flying, April 2004.
- 6. RMAF Principle of Flight.
- 7. Oxford Aviation Academy Book, 2011.
- 8. EC 120B Student Study Guide, January 2017.

## COURSE CODE : EVR 3836 COURSE NAME : ROTARY WING ADVANCED FLYING PENERBANGAN HELIKOPTER – TAHAP III

6 Credits Pre-requisite : Must pass EVR 3826

## **Course Synopsis**

This course introduced student on how to navigate the aircraft from one point to another. Students also will be exposed on the real helicopter operation. At the same time, students will have an opportunity to enhance all knowledge students learn from previous course.

Advance Flying consist of navigation, high altitude, mountain flying, formation flying, Search and Rescue (SAR), underslung, night flying and Final Handling. Assessment is done on completion of every element (sortie) by individual instructors. At the end of Navigation phase and Final Handling phase, the students will assess by examiner in Final Navigation Test (FNT) and Final Handling Test (FHT). Student must pass all the practical assessment. Upon completion FHT, student will consider as a helicopter pilot.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Demonstrate manoeuvre and control the aircraft safely and competently under day time and night time conditions throughout the normal spectrum of the training aircraft operating envelope with advanced navigation.
- 2. Display and adapt tactical flying skills with advanced general flying.
- 3. Perform tactical flying with regard to military requirement.

- 1. Publikasi Udara Tentera Udara DiRaja Malaysia PU 1504 016, September 2015.
- 2. EC 120B Flight Manual, Eurocopter June 2010.
- 3. EC 120B Standard Operating Procedure, Kolej Tentera Udara 2017.
- 4. Kolej Tentera Udara Flying Order Book, June 2017.
- 5. Chief of Airforce Directive Flying, April 2004.
- 6. RMAF Principle of Flight.
- 7. Oxford Aviation Academy Book, 2011.
- 8. EC 120B Student Study Guide, January 2017.

# ELECTIVE PROGRAM COURSES SYNOPSIS (TECHNICAL SPECIALIZATION) (DOMAIN MANAGEMENT) BACHELOR OF AVIATION (ZK61)

# COURSE CODE : TMM 3283 COURSE NAME : HUMAN RESOURCE MANAGEMENT PENGURUSAN SUMBER MANUSIA

3 Credits Pre-requisite: None

#### **Course Synopsis**

This subject is designed to provide students with the knowledge of human resource management (HRM), that include environment of HRM, legal aspect of HRM, job analysis, human resource planning, recruitment and selection, human resources development, employee and labour relations, global HRM, compensation and benefits. Upon completion of this subject, students should have the ability to demonstrate understanding in the concepts of HRM and their applications to organization, assessing the personnel's performance and communicate effectively when carrying out counselling and handling complaints. The students should also be able to plan and organize the appropriate activities that promote the welfare, morale and teamwork of the employees.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Describe managing human resource and identify the concepts of human resource management and divisional matters for their application in an organisation.
- 2. Interpret the appraisal of personnel performance.
- 3. Explain the types of skills needed for HRM in an organisation.
- 4. Analyse training and personnel development programme in an organisation.
- 5. Display leadership, team-work, inter-personal skills.

#### References

1. Noe, R.A. (2015). Fundamentals of human resource management. New York: McGraw-Hill

# COURSE CODE : TMM 3293 COURSE NAME : MANAGEMENT THEORY & PRACTICE TEORI DAN AMALAN PENGURUSAN

3 Credits Pre-requisite: None

## **Course Synopsis**

This subject is designed to provide knowledge and understanding on the principles and practices of management. The syllabus includes aspects on planning, organizing leading and controlling an organization. Among the topics covered are decision-making process, the traits on leadership, teamwork, motivation and entrepreneurship. Students will be exposed to the generic management skills that are required for the job in the future. Students will be encouraged to develop critical thinking skills and teamwork and communication skills through group assignments and presentations.

## **Course Outcomes**

At the end of this course students will be able to:

- 1. Explain the principles and practices of management in their future job as a manager.
- 2. Apply decision making process in resolving issues.
- 3. Differentiate types of leadership.
- 4. Discuss the planning and organizing of activities in an organization.
- 5. Develop leadership, team-work, inter-personal skills through group discussions and presentation.

#### References

1. Robbins, S.P. (2013). Management 11th Ed. New Jersey: Prentice Hall.

# COURSE CODE : DMR 3363 COURSE NAME : FINANCIAL MANAGEMENT AND ACCOUNTING PENGURUSAN KEWANGAN DAN PERAKAUNAN

3 Credits Pre-requisite: None

## **Course Synopsis**

This subject is designed to provide students the fundamentals, principles and concepts of financial management, accounting and public finance. Students are also exposed to the sources and usage of financial information in making decision. Some of the aspects covered in this course are financial statement analysis, time value of money, capital budgeting, cost of capital, cash and working capital management. Students will be also being exposed to public sector accounting and finance, focusing on defence sector finance activities. The delivery of the learning process is through lectures, tutorials, quizzes, assignments and discussions.

## **Course Outcomes**

At the end of this course students will be able to:

- 1. Explain financial statements, ratio analysis and time value of money.
- 2. Discuss cost of capital and capital budgeting process.
- 3. Evaluate, working capital management and forecasting.
- 4. Explain payroll management and accounting.
- 5. Understanding public sector finance and budgeting process.

#### References

1. Ng Kean Kok et al. 2013. Financial Management. 2nd Ed. Oxford University Press. Kuala Lumpur.

# COURSE CODE : DMR 3343 COURSE NAME : ORGANIZATIONAL BEHAVIOUR GELAGAT ORGANISASI

3 Credits Pre-requisite: None

## **Course Synopsis**

This course introduces the concept of Organizational Behaviour (OB), which investigates how individuals, groups and structure impact behaviour within organizations and how such knowledge can be used to improve the effectiveness of the organizations. It also provides Human Resource undergraduate basic exposure about the understanding, concept, principles and theories of OB under three levels of analysis, individual level, group level and organizational level.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the basic concept of Organizational Behaviour
- 2. Understand the impact of OB and how it can be used to improve the effectiveness of the organizations.
- 3. Understand the application of OB.
- 4. Acquire familiarity with the Major issues in the study of OB.

#### References

1. Pinder, C. C. (2014). Work motivation in organizational behaviour. Psychology Press.

# ELECTIVE PROGRAM COURSES SYNOPSIS (TECHNICAL SPECIALIZATION) (DOMAIN COMPUTING) BACHELOR OF AVIATION (ZK61)

# COURSE CODE : TSP 3223 COURSE NAME : OBJECT ORIENTED PROGRAMMING PENGATURCARAAN BERORIENTASIKAN OBJEK

3 Credits Pre-requisite: None

## **Course Synopsis**

This course aims to prepare undergraduates for the programming work including subsequent programming heavy courses such as Compilers and Database Systems Implementation, in addition to the group project and later individual project work. The course contains few topics that have not been mentioned in previous courses, but the defining aim in this course is to illustrate those programming techniques put to work in a sequence of case studies of carefully chosen size, each of them big enough to have significant internal interfaces, but not so large as to be overwhelming. The course will introduce standard tools and techniques for software development: use of a version control system, an automated build process, an appropriate framework for automated unit and integration tests, and profiling tools for studying performance. Participants will be able to choose between an IDE and a traditional editor/compiler setup.

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Understand and identify basic concepts of a high level programming language using object oriented programming correctly.
- 2. Demonstrate and apply their knowledge with basic notions and techniques to develop the algorithm and basic object oriented programming language.
- 3. Analyse a simple object oriented programming problem specification.
- 4. Design and write a program which maps to object oriented programming correctly and effectively.

- 1. Farell, J. (2016). JAVA Programming, 8th Edition. Course Technology; Cengage Learning.
- 2. Liang, Y.D (2014). Introduction to JAVA Programming. 10th Edition, New Jersey, Prentice Hall.
- 3. Malik, DS (2012). JAVA Programming; From Problem Analysis to Program Design, 5 th Edition, International Edition, United States of America: Course Technology Cengage Learning.

# COURSE CODE : TSP 3213 COURSE NAME : FUNDAMENTALS OF PROGRAMMING ASAS KEPADA PENGATURCARAAN

3 Credits Pre-requisite: None

#### **Course Synopsis**

This module equips students with the fundamentals of programming using a beginner friendly language. Students will learn how to solve problems through coding a computer program. Fundamentals on program structure, variables, selection and iteration constructs will be covered. Students will be able to create programs to solve simple programming problems.

## **Course Outcomes**

At the end of this course students will be able to:

- 1. Understand and identify basic concepts in JAVA programming language.
- 2. Design and write a program effectively through JAVA programming language.
- 3. Create an easy solution through JAVA programming operators.
- 4. Demonstrate JAVA programming techniques and algorithms to build a simple application system.

- 1. Farell, J. (2016). JAVA Programming, 8th Edition. Course Technology; Cengage Learning.
- 2. Liang, Y.D (2014). Introduction to JAVA Programming. 10th Edition, New Jersey, Prentice Hall.
- 3. Malik, DS (2012). JAVA Programming; From Problem Analysis to Program Design, 5th Edition, International Edition, United States of America: Course Technology Cengage Learning

# COURSE CODE : TST 3233 COURSE NAME : COMPUTER NETWORK RANGKAIAN KOMPUTER

3 Credits Pre-requisite: None

## **Course Synopsis**

This course will introduce students to the fundamental concepts underlying modern computer organization and architecture. Main objective of the course is to familiarize students about hardware design including logic design, basic structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user. It will cover machine level representation of data, instruction sets, computer arithmetic, CPU structure and functions, memory system organization and architecture, system input/output, multiprocessors, and digital logic. The emphasis is on studying and analysing fundamental issues in architecture design and their impact on performance.

## **Course Outcomes**

At the end of this course students will be able to:

- 1. Understand the concepts in networking, protocols and standards.
- 2. Describe and compare network architectures and network technologies.
- 3. Apply the concepts, hardware and technology in planning, designing and managing of the networks.
- 4. Analyse and solve network problems using hardware and software tools investigation.

- 1. Murdocca, M. and Heuring, V. (2007). Computer Architecture and Organization: An integrated Approach, John Wiley and Sons, Inc.
- 2. Englander, I. (2010). The Architecture of Computer Hardware and Systems Software: An Information Technology Approach. 4th Edition NJ, John Wiley & Sons.
- 3. Stallings, W. (2006). Computer Organization and Architecture: Designing for Performance. 7th Edition Nj: Prentice Hall.

# COURSE CODE : TST 3213 COURSE NAME : COMPUTER ORGANISATION AND ARCHITECTURE ORGANISASI DAN SENIBINA KOMPUTER

3 Credits Pre-requisite: None

## **Course Synopsis**

This course will introduce students to the fundamental concepts underlying modern computer organization and architecture. Main objective of the course is to familiarize students about hardware design including logic design, basic structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user. It will cover machine level representation of data, instruction sets, computer arithmetic, CPU structure and functions, memory system organization and architecture, system input/output, multiprocessors, and digital logic. The emphasis is on studying and analysing fundamental issues in architecture design and their impact on performance

## **Course Outcomes**

At the end of the course students will be able to:

- 1. Define simple machine architecture and the reduced instruction set computers.
- 2. Describe memory control, direct memory access, interrupts and memory organization.
- 3. Explain basic data through the CPU (interfacing, bus control logic and internal communication.

- 1. Murdocca, M. and Heuring, V. (2007). Computer Architecture and Organization: An integrated Approach, John Wiley and Sons, Inc.
- 2. Englander, I. (2010). The Architecture of Computer Hardware and Systems Software: An Information Technology Approach. 4th Edition NJ, John Wiley & Sons.
- 3. Stallings, W. (2006). Computer Organization and Architecture: Designing for Performance. 7th Edition Nj: Prentice Hall.

# ELECTIVE PROGRAM COURSES SYNOPSIS (TECHNICAL SPECIALIZATION) (DOMAIN LOGISTIC) BACHELOR OF AVIATION (ZK61)

# COURSE CODE : DMR 3763 COURSE NAME : SUPPLY CHAIN FOR LOGISTIC RANGKAIAN BEKALAN LOGISTIK

3 Credits Pre-requisite: None

## **Course Synopsis**

The aim of the course is to enable students to discuss the concepts of logistics and supply chain entailing the contemporary theoretical and practical developments in the area of international logistics and supply chain management. The course takes new developments in the field into consideration, in particular the role and the impact of new technological applications like e-commerce in logistics and supply chain. With a mix of teaching methods including seminars and lecturers, the course aims at introducing the student to the complex and dynamic nature of international logistics and supply chain management.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain information technology systems proficiently to support logistics management decisions.
- 2. Analyse the efficiency of current supply chain and logistics operation in the organisation.
- 3. Appraise the planning, implementation, and evaluation of projects.
- 4. Discuss problem using critical-thinking skills as required in logistics/supply chain management.

- 1. Bowersox, D,, Closs, D., & Cooper, M.B. (2012), Supply chain logistics management, 4th Ed, McGraw-Hill/Irwin.
- 2. Ballou, R.H. (2009), Business logistics/Supply chain management, 5th edition, Prentice Hall.
- 3. Coyle, J.J. (2013). Managing supply chain: A logistics approach, Cengage Learning, Canada
- 4. Wisner, J.D, et al, (2009). Principles of supply chain management, Thomson South-Western, USA.

# COURSE CODE : DMM 3993 COURSE NAME : PRINCIPLES OF ACCOUNTING PRINSIP KEWANGAN

3 Credits Pre-requisite: None

#### **Course Synopsis**

This course introduces the principles of accounting covering primarily both financial and management accounting. Students will be exposed to the skills and knowledge of accounting concept, accounting equation, accounting cycle, trial balance equation, preparation final account and financial analysis. This course will include introduction to managerial accounting such as understanding cost concept, cost volume profit analysis and budgeting. The delivery of the learning process is through lectures, tutorials, quiz, assignments and discussions.

#### **Course Outcomes**

At the end of this course students will be able to:

- 1. Understand the fundamental concept, principles of accounting and processes including financial analysis.
- 2. Understand the cost concept, cost volume profit analysis and budgeting.
- 3. Ability to prepare accounting information and interpretation.

- 1. Wood F. (2015), Business Accounting, Vol.1, 13th Edition, Longman Additional references supporting the course.
- 2. Weygandt,J.J.; Kieso, D.E. and Kell, W.G. (1996). Accounting Principles, 4th Edition, John Wiley & Sons.
- 3. Warren, C.S.; Fees, P,E. and Reeve, J.M. (1996). Accounting, 18th Edition, Prentice Hall.
# COURSE CODE : DMM 3733 COURSE NAME : INTEGRATED LOGISTICS SUPPORT (ILS) BANTUAN INTEGRASI LOGISTIK

3 Credits Pre-requisite: None

# **Course Synopsis**

The purpose of this course is to provide students with the knowledge on ILS and its application in the maritime sectors of logistics requirements. Among the topics discussed are elements of ILS, Material Life Circle (MLC), Project Management Principles, System Effectiveness, naval logistics and general naval supply. In addition students will be exposed to the analysis of Reliability, Availability and Maintainability (RAM) with regard to System Effectiveness onboard ships

# **Course Outcomes**

At the end of this course students will be able to:

- 1. Describe the concepts of supply and support in relation to logistics.
- 2. Relate the integrated logistics support concepts in aspects ship supply and maintenance.
- 3. Apply Logistic Support Analysis with regard to the equipment/systems.
- 4. Analyse the Reliability, Availability and Maintainability (RAM) and System Effectiveness.

- 1. Alberto Sols (2016), Integrated Logistics Support, CreateSpace Independent Publishing Platform.
- 2. Blanchard, B.S & Fabrycky, W. J. (2006).System engineering and analysis. London: Pearson Prentice Hall.
- 3. Jones, J.V. (2010).Engineering design: Reliability, maintainability and testability. California: Logistics Management Associates.
- 4. Jones, J.V. (2010).Integrated logistics support handbook. 3 rd Ed. New York: Mc Graw-Hill.
- 5. Jones, J.V. (2006).Supportability engineering handbook: Implementation, measurement and management. New York: Mc Graw-Hill. f. Kumar, D. (2006).Reliability, maintenance and logistics support: A life cycle approach. UK: Springer

# COURSE CODE : TML 3333 COURSE NAME : MILITARY LOGISTICS LOGISTIK KETENTERAAN

3 Credits Pre-requisite: None

#### **Course Synopsis**

The course enables students to discuss the conduct of logistics in a military environment. Student will be exposed to the process and procedures involved in logistics management covering areas such as inventory management, transport management, distribution management and system requirement. They will also be taught in the military context, the concept of service to customers.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the basic concepts of logistic management in military operations.
- 2. Discuss the elements of military logistics procedures and practices.
- 3. Apply the logistics interrelation functions towards organization's strategy and effectiveness.
- 4. Plan for the provision of logistics support in military operations.

- 1. Stock J.R. & Lambert D. M. (2012). Strategic Logistics Management, 4th Edition, New York: McGraw-Hill.
- 2. Closs D. J., & Copper, (2007), Supply Chain Logistics Management, 2nd Edition, New York: McGraw-Hill.
- 3. Fawcett, S.E., Ellram, L.M. & Ogden, J.A. (2007). Supply Chain Management: From Vision to Implementation. Pearson Education

# ELECTIVE PROGRAM COURSES SYNOPSIS (TECHNICAL SPECIALIZATION) (DOMAIN AVIATION) BACHELOR OF AVIATION (ZK61)

## COURSE CODE : EVE 3703 COURSE NAME : FLIGHT CONTROL KAWALAN PENERBANGAN

3 Credits

Pre-requisite: None

#### **Course Synopsis**

This course introduces the basic of flight control system for conventional commercial aircraft. Student will be exposes to the knowledge of flight control history, traditional flight control system, and modern flight control system. This course will emphasis on the mechanical flight controller, fly-by-wire flight controller, engine controller, autopilot system, managed flight system and other related flight control system. Student will also learn how and why the flight control system evolves from a simple mechanical system to complex modern control system and how government regulate the design of flight control system. With a mix of teaching methods including seminars and lecturers, the course aims at introducing the student to the evolvement of flight control system.

#### **Course Outcomes**

At the end of this course, student will be able to:

- 1. Explain in detail the history and policy related in designing flight control system
- 2. Apply the concept of traditional flight controller based on the regulation.
- 3. Apply the concept of modern flight controller based on the regulation.

- 1. Stevens B. L., Lewis F. L. Johnson E. N. (2016). Aircraft Control and Simulation. 3rd Edition, Wiley.
- 2. Adamsen B. (2016) Automatic Flight Control Systems Latest Developments. 1st Edition, Scitus Academics LLC
- 3. Langton R. (2006). Stability and Control of Aircraft System. 1st Edition. Wiley

# COURSE CODE : EVE 3713 COURSE NAME : INTRODUCTION TO AIRCRAFT MAINTAINANCE PENGENALAN KEPADA SENGGARAN PESAWAT

3 Credits Pre-requisite: None

#### **Course Synopsis**

This course highlights important aspects of managing aircraft maintenance activities and developing efficient, reliable, and cost-effective maintenance programs. It also introduces students to management of maintenance support that includes engineering organization, technical training needs, documentation and maintenance planning, hanger activities and line maintenance, and material support.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the basic concepts of aircraft maintenance activities and its requirements.
- 2. Discuss the elements of reliability and cost effective maintenance program.
- 3. Apply the maintenance interrelation functions towards organization's strategy and effectiveness.
- 4. Design aircraft maintenance planning program.

# Reference:

- 1. Harry A Kinnison, Tariq Siddiqui, Aviation Maintenance Management, Second Edition, McGraw Hill Professional (2012)
- 2. AVOTEK, Introduction to Aircraft Maintenance, 3<sup>rd</sup> Edition, Avotek Information Resources, (2012)
- 3. Nyman, Don, (2001), Maintenance Planning, Scheduling, and Coordination, New York: Industrial Press.
- 4. Filippo De Florio(2011) Airworthiness : An Introduction to Aircraft Certification 2<sup>nd</sup> Edition, Elsevier Science & TechnologyOxford, United Kingdom

# COURSE CODE : EVE 3723 COURSE NAME : OCCUPATIONAL SAFETY AND HEALTH IN AVIATION KESELAMATAN DAN KESIHATAN PEKERJAAN DALAM PENERBANGAN

3 Credits Pre-requisite: None

#### **Course Synopsis**

This course introduces students to health and safety administration in aviation operations, build up their awareness and responsibilities for implementing occupational health and safety related to aircraft while on the ground and in the air in future. Throughout the course, students will be emphasis on accident prevention, accident causation, health and safety management, risk assessment and management, health assessment and surveillance, accident and incident investigation, aviation health and safety document, occupational standard, physical hazards, occupational stress and external protection equipment. The course would be conducted incorporate with other health and safety related topics such as legislation, occupational safety and health regulation in Malaysia.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the concepts of health and safety in aviation and the causes of accidents (in particular the role of human error).
- 2. Explain the concepts and components of a health and safety management system.
- 3. Apply appropriate document, risk assessment and accident/incident investigation.
- 4. Demonstrate high role and implement effective health and safety system in aviation industry.

- 1. Phil Hughes & Ed Ferrett, (2015), Introduction to Health and Safety at Work, 4<sup>th</sup> Edition. Elsevier, UK.
- 2. Ahmad Azan & Ungku Azly (2016), Occupational Safety and Health Management, UPNM Press.
- 3. E. Kevin Kelloway, Lori Denise Francis, James Montgomery, Management of Occupational Health and Safety, Edition 5, Nelson Education Limited, 2010
- 4. Charles D. Reese, Occupational Health and Safety Management: A Practical Approach, Second Edition, Edition 2, illustrated, revised, CRC Press, 2008
- 5. Occupational Safety and Health Act (OSHA) 1994 (Act 514)
- 6. Factory and Machinery Act (FMA) 1967
- 7. PU 9104 001 Safety Management.
- 8. PU 9104 002 Flight Safety.
- 9. PU 9104 003 Guideline for Occupational Safety and Health

# COURSE CODE : EVE 3733 COURSE NAME : AVIATION MANAGEMENT AND SECURITY PENGURUSAN DAN KESELAMATAN PENERBANGAN

3 Credits Pre-requisite: None

#### **Course Synopsis**

This course gives an overview of engineering management including security measures and covers topics such as financial principles, management of innovation, technology strategy, and best management practices. The focus of the course is the development of individual skills and team work. This is carried out through an exposure to management tools.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain fundamental concepts and practices used in engineering management.
- 2. Explain the concepts towards the development of business and technology strategies.
- 3. Integrate management knowledge with aviation industries and the relationships in aviation businesses
- 4. Demonstrate and implement projects effectively on aviation security with civil aviation authorities, airlines, and other airport-related agencies

- 1. Steenburgh, Thomas, Jill Avery, et al. "HubSpot: Inbound Marketing and Web 2.0." Harvard Business School Case. Harvard Business School Publishing. Case: 509049-PDF-ENG, 2009.
- 2. Lynch, Merrill. "Understanding Financial Reports." (PDF) Merrill Lynch, Pierce, Fenner & Smith Inc., Report: L–10–03, 2003.
- 3. Global Supply Chain Security and Management,Butterworth-Heinemann,2017,ISBN 9780128007488
- 4. Transportation Safety and Security, Editor(s): Jane A. Bullock, George D. Haddow, Damon P. Coppola,Homeland Security (Second Edition), Butterworth-Heinemann, 2018

# LIST OF CORE UNIVERSITY COURSES BACHELOR OF AVIATION (ZK61)

The University Core Courses are conducted by the Faculty of Defense Studies and Management, Language Centers and Coaching Science Centers.

University Core Courses is a mandatory course for all Bachelor's students subject to the program being followed. Here's a list of University Core Courses offered.

COURSE CODE	COURSES	CREDITS
MPU3132	Appreciation of Ethics and Civilizations	2
LLF 3XX1	Foreign Language I	1
LLA 3XX1	Foreign Language I	Audit
LLE 3012	English for Academic Writing	2
DUS 3022	Introduction to Strategic Studies	2
DUS 3012	Military History	2
LLE 3032	Al-Ghazali Dialogue English Communications	2
LLF 3XX1	Foreign Language II	1
LLA 3XX1	Foreign Language II	Audit
MPU 3142	Philosophy and Currents Issues	2
DUM 3012	Effective Leadership	2
MPU 3412	Human Movement Science	2
MPU 3312	Nationhood in World Politics	2
MPU 3212	Basic Entrepreneurship	2
DUS 3032	Military Law and Law of Armed Conflict	2
	TOTAL	24

# LIST OF CORE UNIVERSITY COURSES

# UNIVERSITY CORE COURSES SYNOPSIS BACHELOR OF AVIATION (ZK61)

# COURSE CODE : MPU 3132 COURSE NAME : APPRECIATION OF ETHICS AND CIVILIZATIONS PENGHAYATAN ETIKA DAN PERADABAN

2 Credits Pre-requisite: None

# **Course Synopsis**

This course explores ethical concepts from the perspective of civilization and culture across the nation. It aims to identify the systems, developmental stages, progress and culture of a nation in strengthening social cohesion. In addition, discussions on contemporary issues in economic, political, social, cultural and environmental aspects from an ethical and civilization perspective can produce students who are morally and professionally. The application of appropriate high impact education practices (HIEPs) is used in the delivery of this course. At the end of this course students will be able to connect ethics and civic-minded citizenship.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain different concepts of ethics and civilization.
- 2. Compare systems, stages of development of social and cultural development across nations.
- 3. Discuss contemporary issues related to economic, political, social, cultural and environmental from the perspective of ethics and civilization.

- 1. Shamsul Amri Baharuddin (Ed), (2012). Modul Hubungan Etnik (2<sup>nd</sup> ed). Bangi: Institut Kajian Etnik, UKM.
- 2. Cheng, Y. (2012) Islam and The Wisdom of Asian Religion. K. L: The Other Press.
- 3. Cheng, Y. (2012) Islam and Secularism: The Quest for A Unity of Knowledge. Kuala Lumpur: IIUM Press International Islamic University Malaysia.
- 4. Dugin, A. (2012). The Fourth Political Theory. London: Arktos.
- 5. Majid Fakhry. (1991). Ethical Theories in Islam. Leiden: J. J. Brill.
- 6. Falkowski, A. F. (1990). Moral Philosophy: Theories, Skills and Applications. Englewood Cliff. NJ: Prentice Hall.
- 7. Guenon. R. (2001). The Reign of Quantity and The Signs of The Times. (Lord Northbourne, Trans.) Hilsdale NY: Sophia Parennis. {Original Work Published 1945}.
- 8. Harai, Y. N. (2017) Homo Deus: A Brief History of Tomorrow. Australia: Harper Collins.
- 9. Mackinnon, B. (2015). Ethics: theory and Contemporary Issues (8<sup>th</sup> ed). Stamford, CT: Cengage Learning.

# COURSE CODE : LLF 3XX1/LLA 3XX1 COURSE NAME : FOREIGN LANGUAGE I BAHASA ASING I

1 Credits Pre-requisite: None

#### **Course Synopsis**

The course is an introduction for student to learn languages other than Malay and English. The language options are: Mandarin, Russia, Spanish, French and Arabic. The course emphasises on the basic oral in respective language and basic grammar for writing. Students are expected to be able to use around 100 vocabulary and communicate using simple chosen language.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. State about self and acknowledge others by greeting them in the target language.
- 2. Identify words and meanings in the target language
- 3. Produce simple sentences in the target language in selected situations.

#### References

1. Based on respective language courses which will be provide accordingly.

# COURSE CODE : LLE 3012 COURSE NAME : ENGLISH FOR ACADEMIC WRITTING BAHASA INGGERIS UNTUK PENULISAN AKADEMIK

2 Credits Pre-requisite: None

#### **Course Synopsis**

The course aims at improving the writing skills of students, especially for professional undertaking. The course exposes students to proposal writing, memos, minutes of meeting and resumes, to participate in meetings as well as to read and listen to various theme-based articles in group and as an individual.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Identify accurate formats for argumentative essays, research proposals, resumes and cover letters.
- 2. Apply various writing strategies critically.
- 3. Interpret meaning and poetic devices of poem.
- 4. Differentiate various types of reading materials.

- 1. Zhu Xiaoxing; Yue Jianling; Lv Yuhong; Zhu Peiru. Menghayati Bahasa Mandarin. (2013). Beijing: Higher Education Press.
- 2. Jiao Huafu; Hong Yunzhi. Common Knowledge about Chinese Geography. (2007). Beijing: Higher Education Press.
- 3. Ren Qiliang; Shi Xu. Common Knowledge about Chinese Culture. (2007). Beijing: Higher Education Press.
- 4. Wang Kai et al. Common Knowledge about Chinese History. (2007). Beijing: Higher Education Press.
- 5. Kang Yuhua and Lai Siping. Conversational Chinese 301. (2005). Beijing: Beijing Language and Culture University Press.

# COURSE CODE : DUS 3022 COURSE NAME : INTRODUCTION TO STRATEGIC STUDIES PENGANTAR PENGAJIAN STRATEGI

2 Credits Pre-requisite: None

# **Course Synopsis**

The aim of the course is to expose students to the various concepts in the area of strategic studies such as military power, the philosophy of war, the employment of military, naval and air power as well as the concepts of defence strategy and cooperation, nuclear strategy and terrorism. As foundation knowledge students would also be introduced to modern principles of war and teachings of selected Western and oriental strategic thinker.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Demonstrate an understanding of the fundamental concept and theories in Strategic Studies.
- 2. Identify the significance applicability scope of SS.
- 3. Apply relevant approaches in explaining events or issues for the Strategic Studies perspective

- 1. Baylis, J., & et al. (2016). Strategy in the Contemporary World, 2nd. Ed., Oxford: Oxford University Press.
- 2. Buzan, B., & Herring, E. (1998). The arms dynamic in world politics. New York: Paperback
- 3. Booth, K., & Herring, E. (1994). Keyguide to information sources in Strategic Studies. New York: Mansell.
- 4. Freedman, Lawrence (Ed.) (1994.) War. Oxford: Oxford University Press.
- 5. Krain, M., Mehlinger, H. D., & Newman, R. M. (2000). Globalization and the challenge of a new century; A reader. New York: Paperback
- 6. Keohane, R. O., & Nye, J. S. (2000). Power and interdependence. United Kingdom: Longman.
- Mahnken, T,. & Maiolo, J. A. (2008). Strategic Studies: A Reader. London: Routledge Niou, E. M. S., Ordeshook, P. C., & Rose, G. F. (2007). The balance of power: Stability in international systems. New York; Cambridge University Press.
- 8. Peter, P. (Ed.). (1986). Makers of Modern Strategy from Machiavelli to the Nuclear Age. Oxford: Oxford University Press.
- 9. Williams, Phil, Donald Golstein, Jay Shafritz. (2006). Classic Readings of International Relations, 3rd Ed. Fort Worth: Harcourt Brace.

# COURSE CODE : DUS 3012 COURSE NAME : MILITARY HISTORY SEJARAH KETENTERAAN

2 Credits Pre-requisite: None

# **Course Synopsis**

The niche area of this University is on security and defence therefor this course will focus on the history of warfare before moving on to the various campaigns and battles from the medieval period to the post-Cold War era. Students shall be exposed on the development of war strategy, tactics, military leadership, impact and limitation of technology, the political and social effects of the campaigns, PKO and the lesson learnt. A section will also be devoted to counter insurgency warfare (CIW) and the historical development of the Malaysian Armed Forces.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Identify the periods of military history and technological development and MAF in PKO.
- 2. Analyse the lesson learnt from wars and campaigns.
- 3. Organise in group to analyse and discuss the wars and campaign based on a given topic.

- 1. Aaron, Ralby DR. (2013), Atlas of Military History: An Illustrated Global Survey of Warfarew from Antiquity to Present Day, Paragon, UK.
- 2. Abdul Razak Baginda, (ed) 2009, Malaysia's Defence & Security since 1957. MSRC Kuala Lumpur: Sdn Bhd
- 3. Nye Jr, J.S. (2014), Understand International Conflicts: An Introduction to Theory and History 7th ed. New Yorl: Pearson Longman.
- 4. Barber, Noel, 1971, The War of the Running Dogs, Arrow Books Ltd, London.
- 5. Khoo Kay Kim 1984, Darurat 1984-1960, Muzium ATM, Kuala Lumpur.
- 6. Nik Mohamed Kamil Nik Mohd Salleh, 2006, Peperangan Dunia Kedua di Kelantan: Disember 1941, United Selangor Press, Kuala Lumpur.
- 7. Percival, A.E. 1971, The War in Malaya, Sagar Publications, New Delhi.

# COURSE CODE : LLE 3032 COURSE NAME : AL-GHAZALI DIALOGUE ENGLISH COMMUNICATION DIALOG AL-GHAZALI: KOMUNIKASI BAHASA INGGERIS

2 Credits Pre-requisite: None

#### **Course Synopsis**

This course is offered to ensure students are able to produce good spoken discourses such as oral presentation, speech and briefing. It will also emphasise on enhancing the level of confidence of the students, preparing effective visual aids, and handling the audience.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. State correctly the principles and mechanics of speech production
- 2. Identify correct literary elements.
- 3. Differentiate spoken discourse.
- 4. Classify different forms of verbal and non-verbal communication.

- 1. Belinda Marie Balraj, Erda Wati Bakar & Masdini Harina Ab Manan. (2009). English for Oral Communication. Kuala Lumpur: Penerbit Universiti Pertahanana Nasional Malaysia.
- 2. Ho Sook Wah et al. (1998). Interactively Speaking. Serdang. UPM Press
- 3. Young, S.K. and Travis, H.P. (2007). Oral Communication: Skills, Choices and Consequences. Illinios: Waveland Press, Inc
- 4. McKenna, C. (1998). Powerful Communication Skills: How to Communicate with Confidence. New Jersey: Career Press

# COURSE CODE : LLF 3XX1/LLA 3XX1 COURSE NAME : FOREIGN LANGUAGE II BAHASA ASING II

1 Credits Pre-requisite : LLF 3XX1/LLA 3XX1

#### **Course Synopsis**

The course is intended for students who took and passed Foreign Language I. The language options are: Mandarin, Russia, Spanish, French and Arabic. The course emphasises on the basic oral in respective language and basic grammar. Students are expected to be able to master 150-200 vocabulary and communicate using simple chosen language.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Identify various type of basic sentences in the target language.
- 2. Express basic sentences in the target language appropriately.
- 3. Apply the correct grammar and vocabulary in basic conversation in the target language.

#### References

1. Based on respective language courses which will be provide accordingly.

# COURSE CODE : MPU 3142 COURSE NAME : PHILOSOPHY AND CURRENTS ISSUES FALSAFAH DAN ISU SEMASA

2 Credits Pre-requisite: None

## **Course Synopsis**

The course covers philosophical relations with the Philosophy of National Education and the Pillars of the State. The use of philosophy as a tool to purify the culture of thought in life through the arts and methods of thinking and human concepts. The main topics in philosophy are epistemology, metaphysics and ethics are discussed in the context of current issues. Emphasis is given to philosophy as a basis for inter-cultural dialogue and to foster common values. At the end of this course students will be able to see the disciplines of science as one comprehensive body of knowledge and related to each other.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain current issues based on philosophy, National Philosophy of Education and National Pillars.
- 2. Explain current issues based on the main flow of thinking in various streams of philosophy,
- 3. Explain current issues through a comparative perspective of philosophy as a basis for establishing inter-cultural dialogue.

- 1. Al-Attas, S. M Naquib. (1991). The Concept of Education in Islam. Kuala Lumpur: ISTAC.
- 2. Al-Faruqi, I. R. (1994). Al-Tawhid: Its Implications for Thought and Life (2<sup>nd</sup> Ed). Herndon: IIIT.
- 3. Philips, D. C. (Ed) (2014). Encyclopedia of Educational Theory and Philosophy (1<sup>st</sup> Ed). SAGE Publication.
- 4. Dzulkifli, A. R & Rosnani, H. (2019) Pentafsiran Baharu Falsafah Pendidikan Kebangsaan dan Pelaksanaannya Pasca 2020. Kuala Lumpur: IIUM Press.
- 5. Hospers, J. (1997). An Introduction to Philosophical Analysis (4<sup>th</sup> Ed). London: Routledge.
- 6. Mitchell, H. B. (2011). Roots of Wisdom: A Tapestry of Philosophical Traditions (6<sup>th</sup> Ed). Wadsworth: Cengage Learning.
- 7. Osman Bakar. (1999). The Classification of Knowledge in Islam. Cambridge, U. K: The Islamic Texts Society.
- 8. Rosnani Hashim (2017). Revitalization of Philosophy and Philosophical Inquiry in Muslim Education. Kull of Education, IIUM.

# COURSE CODE : DUM 3012 COURSE NAME : EFFECTIVE LEADERSHIP KEPIMPINAN BERKESAN

2 Credits Pre-requisite: None

# **Course Synopsis**

Military Leaders need to integrate current knowledge, skill development and personal challenges faced in leading men in the military and civil environment. This course will introduce students to the personal challenges and competencies that are critical for effective leadership and communication. The focus is on developing basic knowledge and comprehension of leadership dimensions and concepts in the military and civilian environments, attributes, values and core competencies. Students shall be exposed to the need for military leaders to adapt to varying scenarios, be it in peace or war; tactical, operational or strategic levels; leading at service, combined and joint force levels; leading staff and operational units.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Apply leadership skills to know to when to manage and when to lead your men and the organisation.
- 2. Determine the appropriate leadership styles based on the situation and individual needs.

- 1. Manning George & Curtis Kent. The Art of Leadership, McGraw Hill International 5th.Edition, Boston US, 2014. ISBN 978-007-127628-3
- 2. Daft Richard L. Daft & Andrew Pirola-Merio, The Leadership Experience, Asia Pacific Edition, Cengage Learning Australia Pty Ltd. 20014
- 3. Andrew J. DuBrin, Principles of Leadership, South Western CENGAGE Learning, 7th Edition, US 2014
- 4. Richard Hughes, Robert C Ginnett, Gordon J Curphy, Leadership, Enhancing the Lessons of Experience, McGraw Hill International , 7th Edition United States 2015
- 5. Robert L Taylor, William E. Rosenbach, Eric B. Rosenbach Military Leadership In Pursuit of Excellence,8 th. Edition Westview Press 2015

# COURSE CODE : PSK 3012 COURSE NAME : HUMAN MOVEMENT SCIENCE SAINS KELAKUAN MANUSIA

2 Credits Pre-requisite: None

# **Course Synopsis**

This course will discuss the sports science concepts and professionally practice these concepts various levels of study. This course will also explore the overall concept of science in sports which is related to the objectives, philosophy, history, issues, and importance of science in sports, development and expansions of sports coaching. In addition, this course is designed to provide the student with an advanced understanding of science components related to sports in order to develop Leaders of Character. Particular attention will be placed upon a good understanding of the significance of sciences in relation to physical exercise and leadership components. The course will also focus on the important concepts and basic principles to understand the structure and function of human body in response to various exercising conditions. Besides regular lectures and reading, group discussions and presentations will be a part of the learning process.

#### **Course Outcomes**

At the end of the course students will be able to:

- 1. Understand and master the concept of science in sport activities.
- 2. Identified through high professionalism, values and behaviour in order to achieve better leadership skills from sports activities.
- 3. Analyse creatively and critically in developing coach athlete's satisfaction towards achievement of excellent results.
- 4. Apply social responsibility, effective communication and manage work in the sports environment.

- 1. Anshel, M.H (2014). Applied Health Fitness Psychology. ISBN : 978- 1-4504-0062-6.
- 2. Bompa, T. (2015) Conditioning Young Ahletes.ISBN : 978-1-4925- 0309-5.
- 3. Haff, G.G., & Triplett, N.T (2016). Essentials of Strength Training and Conditioning (4th ed.). Human Kinetics.com. ISBN : 978-1-4925-0162-6.
- 4. Kassim, M; Ahmad, S.K.S & Muda,B.B. (2016). Konsep Latihan Dalam Sukan. Pekan Ilmu Publication, Kuala Lumpur. ISBN: 9789674380199.
- 5. Kravitz, L. & Bubbico, A. (2015). Essentials of Eccentric Training with Online Video. ISBN : 978-1-4504-6830-5.
- 6. Orlick, T. (2016). In Pursuit of Excellence (5th ed.). ISBN : 978-1- 4504-9650-6

# COURSE CODE : MPU 3312 COURSE NAME : NATIONHOOD IN WORLD POLITICS KENEGARAAN DALAM POLITIK DUNIA

2 Credits Pre-requisite: None

# **Course Synopsis**

The course will expose the students to complex issues that dominate world political theatres in the 20th and 21st centuries. Initially, students will be introduced to basic concepts in political science and sociology and to ideas and thought of philosophers and political thinkers like Plato (The Republic), Aristotle (Politics), Kautilya (Arthasastra), Machiavelli (The Prince), Marx (Das Capital), Al-Farabi (Al-Madinah Al-Fadillah), Ibnu Khaldum (Mukaddimah), Tun Sri Lanang (Sejarah Melayu) etc.; and how their ideas were crystallised into ideologies that were adopted by new nation-states of the 20th century. Then, students will be guided to understand on circumstances that led to the rise and collapse of Empires (Rome-Constantinople, Uthmanniah, British, Melaka, China, etc.); the outbreak of the French Revolution, and First and Second World War (nationalism in the new nation- states) that gave rise to fascists and dictators like Hilter, Mussolini, Stalin, etc. against democratic-liberalism of Anglo American. Equipped with these conceptual tools and historical backdrop, students will be able to understand the politics of the Vietnam War, conflict in the Balkans, Palestine Israel conflict, etc. which are manifestations of multiple fault lines that culminated into the new epoch of the Cold War, ethnic conflict or cleansing? Clash of civilizations (S. Huntington), and other possibilities which should help them to develop their mind as "Intellectual Leader of character".

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain about the nationhood and the dynamics of the development of nationalism issues starting from an empire to a nation state.
- 2. Demonstrate the war and political conflicts history due to differences in ideologies, ethnicities and civilization, and then relate to the building of a nation state.
- 3. Apply the world ideologies and philosophies among Western and Islamic political thinkers.

- 1. Crowley, Roger. (2006). 1453. The Holy War for Constantinople and the Clash of Islam and the West (1453. Detik- detik jatuhnya Constantinople ke tangan muslim (terj) Jakarta, Alvabet (2007).
- 2. Fukuyama, Francis. (1992). The End of History and The Last Man. New York: Avon Books.
- 3. Huntington, Samuel P. (1996). The Clash of Civilizations and The Remaking of World Order. New York: Simon & Schuster.

# COURSE CODE : MPU 3212 COURSE NAME : BASIC ENTREPRENEURSHIP ASAS KEUSAHAWANAN

2 Credits Pre-requisite: None

# **Course Synopsis**

This course introduces students to the concept of entrepreneurship and skills, and information that entrepreneurs use to lead a business. The course examines key organizational attributes necessary for organizations to succeed in any business environment. These attributes include strategic planning, marketing, financing, legal matters and cash flw. Finally, the course is designed to help students build the skills to develop and write a good business plan.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Explain the fundamental concepts and principles of entrepreneurship and characteristics of entrepreneur.
- 2. Differentiate between entrepreneurs, managers, and leaders as change agents.
- 3. Apply general managerial methods and creativity to support decision making.
- 4. Develop and write a business model and business plan.
- 5 Construct team work in gathering, analysing and reporting on business ideas into proper planning.

- 1. Hisrich, R.D. and Peters, M.P. (2013). Entrepreneurship. 9th Edition. New York:
- 2. Irwin McGraw-Hill. Kuratko, D.F. (2008). Entrepreneurship: Theory, Process, Practice. 8th Edition. Ohio: South-Western.



# COURSE CODE : DUS 3032 COURSE NAME : MILITARY LAW AND LAW OF ARMED CONFLICT UNDANG-UNDANG TENTERA DAN UNDANG-UNDANG KONFLIK BERSENJATA

2 Credits Pre-requisite: None

# **Course Synopsis**

This course introduces students with basic understanding of the history, concept and purpose of military and armed conflict law. Students will be provided with the basic foundation knowledge of military and armed conflict law. Students will be taught various laws, regulations and procedures on the subject and will be expose to the various practical applications of the law through discussions, exercises and class assignments.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Identify and explain the history of military and armed conflict laws, legislations and relevant secondary sources of law.
- 2. Apply relevant principles governing military and armed conflict law.
- 3. Demonstrate skill to provide views, opinions and solution to basic issues of military and armed conflict law.

- 1. Federal Constitution
- 2. Armed Forces Act 1972.
- 3. Armed Forces (Board Of Inquiry) Rules 1976.
- 4. Armed Forces (Court-Martial) Rules of Procedure 1976.
- 5. Armed Forces (Field Punishment) Regulations 1976.
- 6. Armed Forces (Imprisonment And Detention) Rules 1976.
- 7. Armed Forces (Summary Jurisdiction) Regulations 1976.
- 8. Armed Forces (Forfeiture And Restoration Of Forfeited Service) Regulations 2000.
- 9. Armed Forces (Terms Of Service Of Regular Forces) Regulations 2013.
- 10. 1949 Geneva Convention I for the Amelioration of the Wounded and Sick in the Armed Forces in the Field.
- 11. 1949 Geneva Convention II for the Amelioration of Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea.
- 12. 1949 Geneva Convention III Relative to the Treatment of Prisoners of War.
- 13. 1949 Geneva Convention IV Relative to the Protection of Civilian Persons in Time of War.

# UNIVERSITY ELECTIVE COURSES BACHELOR OF AVIATION (ZK61)

A total number of six (6) credits were offered as part of university elective course to cadet officers. The table below shows the course offered for the university elective courses.

LIS		
CODE	COURSES	CREDITS
ALK 3112	General Military Training I	2
ALK 3122	General Military Training II	2
QKS 3172	Unarmed Combat	2
	Total	6

# UNIVERSITY ELECTIVE COURSES SYNOPSIS BACHELOR OF AVIATION (ZK61)

COURSE CODE : ALK 3112 COURSE NAME : GENERAL MILITARY TRAINING I LATIHAN KETENTERAAN UMUM I

2 Credits Pre-requisite: None

#### **Course Synopsis**

In this semester the training is more towards the introduction to leadership, administration, general military knowledge and weapon control (Pistol).

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Install and handle weapons properly, correctly in rapid time and able to react when facing weapons stoppages.
- 2. Demonstrate leadership qualities in managing ATM personnel.
- 3. Explains the importance of administration personnel such as Group Insurance, ATM Transit Course Plan, as well as ATM welfare Funds.
- 4. Explain the principles of war and the types of operations in the ATM.

- 1. Panduan Pengurusan Dokumentasi Anggota ATM (MP 7.2.1A TD).
- 2. Falsafah Latihan Individu dan Profil Anggota TD(MD 7.1A TD).
- 3. Ilmu Medan Perang (T 3213).
- 4. Teori Senjata Kecil Infantri (Sementara) (T 3217).
- 5. Latihan Menggunakan Pistol 9mm HK S S/Browning (T 3212).
- 6. Panduan Prosedur Mahkamah Tentera (T 3021A).
- 7. Kemahiran Pengendalian Senjata(T 3225).

# COURSE CODE : ALK 3122 COURSE NAME : GENERAL MILITARY TRAINING II LATIHAN KETENTERAAN UMUM II

2 Credits Pre-requisite: None

#### **Course Synopsis**

In this semester the training is more towards to weapon drills, introduction to staff duty and military law.

# **Course Outcomes**

At the end of the course students will be able to:

- 1. Demonstrate weapon drill using styer properly and correctly.
- 2. Write Warning Order and type of Operation reports including military correspondent in sequence and correctly.
- 3. Explain the process of reporting a charge, arrest and rehabilitation of legal charges and orders for a Senior Officer and Low Commander based on proper references.

- 1. Repal AUG Styer (T3249).
- 2. MAF JP0.01- MAF Syaff Manual (Service Writing).
- 3. Akta Angkatan Tentera 1972.
- 4. Panduan Prosedur Mahkamah Tentera (T 3021A).
- 5. Warta Kerajaan 1976.
- 6. Panduan Dokumentasi Unit (T 3551).

#### COURSE CODE : QKS 3172 COURSE NAME : UNARMED COMBAT TEMPUR TANPA SENJATA

2 Credits Pre-requisite: None

#### **Course Synopsis**

This course introduces the Cadet Officer to one of the martial arts presented in the Malaysian Armed Forces, Unarmed Combat. Martial art is a form of training that reinforces the character and discipline of officers and soldiers. It will be the last bull to defend himself or someone protected from any threat. Therefore, the course is designed to equip Cadet Officers with martial arts and Silat and Tae Kwon Do art elements are also incorporated into this Unarmed Combat. The course will be conducted for the fourth semester and Cadet Officers are required to complete the highest grades in each of the arts studied. Therefore, this course must be offered to the Cadet Officer.

# **Course Outcomes**

At the end of this course students should be able to:

- 1. Demonstrate strong physical fitness as a Malaysian Armed Forces Officer.
- 2. Demonstrate high confidence in dealing with opponents.
- 3. Adapt skills such as punches, punches, kicks and unarmed combat patterns.

- 1. Akademi Latihan Ketenteraan, Rancangan Pengurusan Latihan, 2019.
- 2. PULAPOT, Precis Asas Tempur Tanpa Senjata.
- 3. PULAPOT, Precis Lanjutan Tempur Tanpa Senjata.
- 4. PULAPOT, Precis Jurulatih Tempur Tanpa Senjata.
- 5. PULAPOT, i-TTS Tentera Darat, 2015.

#### MAKLUMAT UNTUK PELAJAR

#### 1. Facebook Fakulti Kejuruteraan (FKJ)

Pelajar disarankan untuk mendaftar di dalam facebook FKJ bagi urusan komunikasi dua hala antara pihak pentadbiran dengan pelajar. Segala urusan hal ehwal akademik dan lain lain berkaitan pelajar akan disalurkan kepada pelajar melalui sistem *facebook*. Mohon pelajar mendaftar dalam *facebook* carian **PMF FKJ (UPNM)** 

#### 2. Website Fakulti Kejuruteraan (FKJ)

Pelajar boleh mendapatkan maklumat info FKJ dan staf FKJ di dalam website FKJ: <u>http://eng.upnm.edu.my/</u>

#### 3. Group Whatsapp Fakulti Kejuruteraan (FKJ)

Pelajar akan didaftarkan mengikut tahun bagi tujuan komunikasi antara pensyarah dan staf berkaitan segala perkara akademik dan fakulti. Pelajar boleh berkomunikasi terus melalui *WhatsApp* yang akan di buat oleh staf pentadbiran FKJ.

# 4. Group Telegram Pelajar Fakulti Kejuruteraan (FKJ)

Segala urusan hal ehwal akademik dan lain lain berkaitan pelajar akan disalurkan kepada pelajar melalui kumpulan ini. Mohon pelajar mendaftar dalam aplikasi Telegram dengan carian <u>Student FKj UPNM</u>

# TANGGUNGJAWAB PELAJAR

- 1. Menyempurnakan semua keperluan akademik seperti termaktub dalam kurikulum Program Pengajian yang diikuti di Universiti.
- 2. Membuat Pendaftaran Kursus dalam tempoh yang ditetapkan.
- 3. Membuat validasi pendaftaran kursus dalam tempoh yang ditetapkan.
- 4. Membayar yuran Universiti mengikut masa dan jumlah yang ditetapkan.
- 5. Menghadiri kuliah/latihan Amali/ latihan industri yang ditetapkan oleh Universiti
- 6. Mengambil tindakan proaktif untuk mendapatkan panduan dan nasihat daripada pensyarah dan penasihat akademik
- 7. Mengambil akauntabiliti sepenuhnya terhadap sebarang kesan ketidakpatuhan terhadap peraturan dan prosedur yang telah ditetapkan.

TAHUN AKADEMIK PROGRAM SARJANA MUDA				
Pendaftaran dan minggu orientasi	1 Minggu			
Semester 1				
Perkuliahan	7 Minggu			
Cuti Pertengahan Semester	1 Minggu			
Perkuliahan	7 Minggu			
Minggu Ulangkaji	1 Minggu			
Peperiksaan Akhir	3 Minggu			
Cuti Akhir Semester I	5 Minggu			
Semester 2				
Perkuliahan	7 Minggu			
Cuti Pertengahan Semester	1 Minggu			
Perkuliahan	7 Minggu			
Minggu Ulangkaji	1 Minggu			
Peperiksaan Akhir	3 Minggu			
Cuti Akhir Tahun Akademik	9 Minggu			
Semester Pendek				
Perkuliahan dan Peperiksaan	8 Minggu			
Cuti Akhir Semester	1 Minggu			

TEMPOH PROGRAM PENGAJIAN				
Program Pengajian	Tempoh			
Pongojian Tigo Tabun	Minimum 6 Semester			
	Maksimum 10 Semester			
Pongojian Empat Tabun	Minimum 8 Semester			
rengajian Empari anun	Maksimum 12 Semester			

STATUS AKADEMIK PELAJAR				
SYARAT PNGK TARAF KEDUDUKAN				
PNGK > 2.00	Kedudukan Baik (KB)			
2.00> PNGK > 1.70	Kedudukan Bersyarat (KS)			
PNCK < 1.70	Kedudukan Gagal dan Diberhentikan			
FNGR \$ 1.70	Pengajian (KG)			

- 1. Pelajar yang mendapat PNGS < 1.00 tetapi mendapat PNGK > 2.00 boleh
  - a. Meneruskan pengajian dengan persetujuan Universiti; Atau
  - b. Di arah menangguh pengajian pada semester berikutnya; Atau
  - c. Diberhentikan Pengajian
- 2. Pelajar boleh diberhentikan daripada program pengajian semasa sekiranya
  - a. Mendapat KS dua semester berturut -turut; Atau
  - b. Mendapat status KG pada mana-mana semester; Atau
  - c. Gagal memperoleh kredit minimum lulus program dalam tempoh pengajian maksimum yang dibenarkan.

HUBUNGAN ANTARA MARKAH, GRED DAN NILAI GRED					
MARKAH	GRED	NILAI GRED			
90-100	A+	4.00			
80-89	A	4.00			
75-79	A-	3.67			
70-74	B+	3.33			
65-69	В	3.00			
60-64	B-	2.67			
55-59	C+	2.33			
50-54	С	2.00			
45-49	C-	1.67			
40-44	D+	1.33			
35-39	D	1.00			
30-34	D-	0.67			
29-0	E	0.00			
GAGAL DAN TATATERTIB	F	0.00			

# PENANGGUHAN PENGAJIAN

- 2. Pelajar yang disahkan sakit untuk tempoh melebihi (4) minggu oleh pegawai perubatan Universiti/Kerajaan daripada hospital bertauliah boleh memohon untuk menangguh pengajian. Penangguhan ini tidak diambil kira sebagai semester pengajian
- 3. Pelajar boleh menangguh pengajian atas alasan selain daripada sebab –sebab kesihatan. Pelajar tajaan perlu mendapat kelulusan bertulis daripada penaja. Penangguhan ini akan diambil kira sebagai semester pengajian.
- 4. Permohonan penangguhan pengajian perlu dimajukan oleh pelajar dengan surat sokongan sakit atau surat sokongan lain yang disahkan oleh pegawai perubatan dan diserahkan kepada Dekan untuk pertimbangan. Permohonan penangguhan pengajian perlu mendapat kelulusan SENAT bagi pelajar awam. Manakala Pelajar Kadet, perlu mendapat kelulusan daripada Majlis Angkatan Tentera (MAT).
- 5. Pelajar yang memohon penangguhan pada semester berlangsung dan mendapat kelulusan akan diberi kod MP (Menangguh Pengajian).
- 6. Pelajar hanya dibenarkan menangguh untuk dua semester sahaja dalam tempoh pengajian.
- 7. Penangguhan pengajian selain sebab kesihatan mestilah dibuat sebelum cuti pertengahan semester.

# FAKULTI KEJURUTERAAN UNIVERSITI PERTAHANAN NASIONAL MALAYSIA KEM PERDANA SUNGAI BESI 57000 KUALA LUMPUR NO TEL: 03-90513400/3063/3408 NO FAKS: 03-90513017



# SCIENTISTS DREAM ABOUT DOING GREAT THINGS. ENGINEERS DO THEM.

James A Michener

# Engineer:

A genius with godly math and science abilities, that can solve problems in ways normal people do not understand.

Fakulti Kejuruteraan Unit Akademik Tingkat 7, Bangunan Bistari, Universiti Pertahanan Nasional Malaysia, Kem Sungai Besi, Sungai Besi, 57000 Kuala Lumpur No. Tel: 03-9051 3400 ext 3009