

# JABATAN KEJURUTERAAN MEKANIKAL (JKM)

## STRUKTUR PROGRAM IJAZAH SARJANA MUDA

Kursus-kursus untuk Program Ijazah Sarjana Muda diklasifikasikan kepada Kursus Teras Universiti, Elektif Universiti, Teras Fakulti, Elektif Fakulti, Teras Program dan Elektif Program. Jumlah kredit wajib diambil bergantung kepada keperluan program yang diikuti.

### STRUKTUR KURSUS DAN JUMLAH KREDIT KEPERLUAN PROGRAM

Program ditawarkan : **Program Sarjana Muda Kejuruteraan Mekanikal (ZK08)**

Jumlah keperluan kredit yang perlu dipenuhi untuk bergraduan adalah seperti mana jadual di bawah dan tempoh pengajian yang perlu diikuti adalah lapan (8) semester lazim. Pecahan kursus yang perlu diambil adalah seperti berikut:

KURSUS	KREDIT (AWAM)	KREDIT (KADET)
Teras Universiti	26	26
Teras Fakulti	18	18
Teras Program	80	80
Elektif Program	9	9
*Elektif Universiti	8	15
<b>JUMLAH</b>	<b>141</b>	<b>148</b>

\* Pelajar Kadet : Elektif Universiti yang perlu diambil adalah ALK (12 kredit) dan Tempur Tanpa Senjata (TTS) (3 kredit)

Pelajar Awam: Elektif Universiti yang perlu diambil adalah PLS (6 kredit) dan mana-mana kursus Ko-kurikulum mengikut pilihan (2 kredit)

## HASIL PEMBELAJARAN

Pencapaian pelajar diukur oleh hasil pembelajaran. Hasil pembelajaran ini menetapkan kompetensi yang patut diperoleh oleh pelajar apabila selesai mengikuti satu-satu program pengajian. Berikut adalah 'Programme Learning Outcome' (PEO) bagi Program Sarjana Muda Kejuruteraan dan 'Programme Outcome' (PO) bagi Program Sarjana Muda Kejuruteraan Mekanikal.

### 'Programme Educational Objectives' (PEO)

PEO 1 – 'Graduate possess positive personal values; subservient to God, responsible and dedicated to work in societies of diverse backgrounds in serving the community and the nation and able to communicate effectively across a range of contexts and audiences'.

PEO 2 – 'Graduate are technically competent and able to apply their knowledge and skills in performing their duties professionally and ethically as an engineer, leader and/or manager while maintaining their professional development and contribution for the betterment of the nation and mankind'.

PEO 3 – 'Graduates possess military leadership and professional qualities contributing towards the development of the nation and worldwide with abilities to respond and adapt readily to changing situations including in time of emergency and during war'.

### 'Program Outcome' (PO)

#### *Technical Knowledge and Competencies*

PO1 - 'Ability to acquire and apply knowledge of sciences, mechanical and military engineering principles'.

PO2 - 'Ability to competently apply the techniques, skills and use modern engineering tools'.

PO3 - 'Ability to utilize systems approach to design and evaluation of operational performance'.

PO4 - 'Ability to identify, formulate and solve mechanical engineering related problems'.

#### *Generic Skills*

PO5 - 'Ability to communicate effectively and with confidence not only with engineers but also with the community at large'.

PO6 - "Ability to respond and adapt to changing situations with special attention toward sustainable development, peace keeping and humanitarian needs'.

PO7 - 'Ability to function effectively as an individual and/or in a group with the capacity to be a leader/manager to achieve common goals'.

PO8 - 'Ability to understand of professional ethical responsibilities and commitment to them'.

PO9 - 'Ability to understand the social, cultural, global and environmental responsibilities of a professional engineer in civilian and military context'.

PO10 - 'Ability to seek and acquire contemporary knowledge including defence matters'.

PO11 - 'Possess entrepreneurship qualities'.

**SENARAI KURSUS TERAS PROGRAM YANG PERLU DIPENUHI (80 KREDIT) :**

KOD	KURSUS	KREDIT
EEE 1012	Introduction to Electrical Engineering	2
EEE 2022	Electronics	2
EMD 4713	Capstone Project	3
EMD 3703	Mechanical Engineering Design	3
EML 2802	Engineering Laboratories I	2
EML 2812	Engineering Laboratories II	2
EML 3822	Engineering Laboratories III	2
EML 3832	Engineering Laboratories IV	2
EMM 1203	Engineering Mechanics (Statics)	3
EMM 2173	Materials Engineering	3
EMM 1223	Dynamics	3
EMM 2303	Strength of Materials I	3
EMM 2503	Thermodynamics I	3
EMM 2603	Fluid Mechanics I	3
EMM 3223	Mechanics of Machines and Vibration	3
EMM 3303	Strength of Materials II	3
EMM3314	Industrial Training	4
EMM 3412	Instrumentations	2
EMM 3503	Thermodynamics II	3
EMM 3603	Fluid Mechanics II	3
EMM 4433	Computer Aided Engineering (CAE)	3
EMM 4422	Control Engineering	2
EMM 4502	Heat Transfer	2
EMM 4902	Engineers in Society	2
EMP 1102	Technical Drawing	2
EMP 1111	Workshop Practices	1
EMP 1152	Engineering Drawing	2
EMP 3113	Manufacturing Technology	3
EMP 4193	Operation and Engineering Management	3
EMT 4752	Final Year Project I	2
EMT 4754	Final Year Project II	4

KOD KURSUS	KURSUS ELEKTIF PROGRAM (9 KREDIT)	KREDIT
<i>MECHANICAL</i>		
EME 4163	Composite Material	3
EME 4223	Vibration	3
EME 4233	Syntehsis and Analysis of Mechanisms	3
EME 4523	Air-Conditioning and Refrigeration	3
EME 4603	Computational Fluid Dynamics	3
EME 4613	Fluid Power Technology	3
EME 4623	Turbomachinery	3

EME 4913	Non-Destructive Testing	3
EME 4923	Tribology	3
<i>AUTOMATIVE</i>		
EME 4243	Vehicle Dynamics and Handling	3
EME 4323	Vehicle System and Structure	3
EME 4533	Internal Combustion Engine Performance	3
<i>AERONAUTICAL</i>		
EME 4333	Aircraft Systems and Structure	3
EME 4543	Aircraft Propulsion	3
EME 4633	Aerodynamics and Flight Mechanics	3
<i>MARINE TECHNOLOGY</i>		
EME 4553	Marine Engineering System	3
EME 4193	Ship Maintenance System	3
EME 4343	Ship Design and Structures	3

**STRUKTUR PROGRAM PENGAJIAN  
SARJANA MUDA KEJURUTERAAN MEKANIKAL**

SEMESTER 1				SEMESTER 2			
Kod	Kursus	Kredit	Pra-Syarat	Kod	Kursus	Kredit	Pra-Syarat
LAN 1012	Islamic and Asian Civilizations	2		LAN 1032	Ethnic Relation	2	
LEL1012	English for Academic Writing	2		LEL1022	English for Oral Communication	2	
EFA1103	Engineering Mathematics I (Calculus and Linear Algebra)	3		EFA1203	Engineering Mathematics II (Differential Equation and Transform)	3	
EEE1012	Introduction to Electrical Engineering	2		EFC1103	Computing I (C & C++)	3	
EMP1102	Technical Drawing	2		EMP1152	Engineering Drawing	2	EMP1102
EMP1111	Workshop Practices	1		EMM1223	Dynamics	3	EMM1203
EMM1203	Engineering Mechanics (Statics)	3					
<b>JUMLAH</b>		<b>15</b>		<b>JUMLAH</b>		<b>15</b>	

INTER-SESI 1			
Kod	Kursus	Kredit	Pra-Syarat
*ALK 1024	Latihan Ketenteraan Umum	4	
DUS1062	Military History	2	
*OKS1621	Tempur Tanpa Senjata (Asas)	1	
<b>JUMLAH</b>		<b>7</b>	

\* Hanya diambil oleh pelajar Kadet

SEMESTER 3				SEMESTER 4			
Kod	Kursus	Kredit	Pra-Syarat	Kod	Kursus	Kredit	Pra-Syarat
LAN1042	Acculturation of Entrepreneurship	2		DUS2022	Introduction to Strategic Studies	2	
DUS2052	Laws of Armed Conflict	2		EFA2213	Engineering Mathematics IV (Statistics)	3	
EFA2103	Engineering Mathematics IIIA (Complex Variable and Vector)	3		EFC1203	Computing II (Numerical Analysis)	3	
EEE2022	Electronic	2	EEE1012	EML2812	Engineering Laboratories II	2	EML 2802
EML2802	Engineering Laboratories I	2		EMM2503	Thermodynamics I	3	
EMM2173	Materials Engineering	3		EMM2603	Fluid Mechanics I	3	EMM 1203
EMM2303	Strength of Materials I	3	EMM1203				
<b>JUMLAH</b>		<b>17</b>			<b>JUMLAH</b>	<b>16</b>	

INTER-SESI 2			
Kod	Kursus	Kredit	Pra-Syarat
*ALK 2014	Latihan Ketenteraan Umum	4	
DUS2012	Military Law	2	
*OKS2621	Tempur Tanpa Senjata (Lanjutan)	1	
<b>JUMLAH</b>		<b>7</b>	

\* Hanya diambil oleh pelajar Kadet

SEMESTER 5				SEMESTER 6			
Kod	Kursus	Kredit	Pra-Syarat	Kod	Kursus	Kredit	Pra-Syarat
LFL 11X2	Foreign Language I	2		LFL12X2	Foreign Language II	2	LFL11X2
LAN1022	Malaysian Nationhood	2		EMP3113	Manufacturing Technology	3	EMP1111
EML3822	Engineering Laboratories III	2	EML2812	EMD3703	Mechanical Engineering Design	3	EMM1223 EMM3303
EMM3303	Strength of Materials II	3	EMM2303	EML3832	Engineering Laboratories IV	2	EML3822
EMM3503	Thermodynamics II	3	EMM2503	EMM3223	Mechanics of Machine and Vibration	3	EMM1223
EMM3603	Fluid Mechanics II	3	EMM2603	EMM3412	Instrumentations	2	EEE2022
<b>JUMLAH</b>		<b>15</b>		<b>JUMLAH</b>		<b>15</b>	

INTER-SESI			
Kod	Kursus	Kredit	Pra-Syarat
EMM 3314	Industrial Training	4	*
<b>JUMLAH</b>		<b>4</b>	

\*EMM3503, EMM3303, EMM3603, EMM3223

SEMESTER 7				SEMESTER 8			
Kod	Kursus	Kredit	Pra-Syarat	Kod	Kursus	Kredit	Pra-Syarat
EMT4752	Final Year Project I	2	**	EMT4754	Final Year Project II	4	EMT 4752
EMD4713	Capstone Project	3	EMM 3703	EME4XX3	Elective II	3	
EMM4433	Computer Aided Engineering	3		EME4XX3	Elective III	3	
EMM4422	Control Engineering	2	EMM1223 EEE2022 EFA1203	EMM4902	Engineers in Society	2	
EMM4502	Heat Transfer	2	EMM3503	EMP4193	Operation & Engineering Management	3	
EME4XX3	Elective I	3					
<b>JUMLAH</b>		<b>15</b>		<b>JUMLAH</b>		<b>15</b>	

\*\* EMD 3703, EMM 3223, EMM 3303, EMM 3503 & EMM 3603

INTER-SESI 4			
Kod	Kursus	Kredit	Pra-Syarat
*ALK 3014	Latihan Ketenteraan Umum	4	
DUM 2062	Organisational Leadership	2	
*QKS 3621	Tempur Tanpa Senjata (Pengukuhan Lanjutan)	1	
<b>JUMLAH</b>		<b>7</b>	

\* Hanya diambil oleh pelajar Kadet

**Nota : PELAJAR AWAM**

- i. Pelajar Awam dikehendaki mendaftar mana-mana kursus Ko-kurikulum sebanyak 2 kredit pada mana-mana semester pengajian tertakluk kepada jumlah maksimum kredit dibenarkan.
- ii. Kursus PLS perlu didaftarkan 1 kredit setiap semester daripada semester 1 hingga semester 6

1)

### KURSUS TERAS UNIVERSITI

Kursus Universiti merupakan kursus wajib kepada semua pelajar Program Ijazah Sarjana Muda. Berikut merupakan senarai kursus Teras Universiti yang ditawarkan:

KOD KURSUS	KURSUS	KREDIT
DUM 2062	Organisational Leadership	2
DUS 1062	Military History	2
DUS 2012	Military Law	2
DUS 2022	Introduction to Strategic Studies	2
DUS 2052	Laws of Armed Conflict	2
LAN 1012	Tamadun Islam and Tamadun Asia	2
LAN 1022	Kenegaraan Malaysia	2
LAN 1032	Hubungan Etnik	2
LAN 1042	Asas Keusahawanan	2
LEL 1012	English For Academic Writing	2
LEL 1022	English For Oral Communication	2
LFL 1XX2	Bahasa Asing I*	2
LFL 1XX2	Bahasa Asing II*	2
<b>JUMLAH</b>		<b>26</b>

\* Semua pelajar hanya wajib memilih satu set (2 semester bahasa asing yang sama) dari enam Kursus Bahasa Asing yang ditawarkan.

**DUM 2062 ORGANISATIONAL LEADERSHIP**

The aim of the course is to provide students with a broad but firm foundation on the key aspects of leadership studies. Students will initially be exposed to the various leadership theories and principles before embarking on the discussions of case studies where the leadership styles of certain selected leaders will be examined. Although the focus of the course is on leadership in general, a substantial portion of the course will be devoted to the study of military leadership.

**DUS 1062 MILITARY HISTORY**

The course will initially focus on the history of warfar before moving on to the various campaign and battle studies panning 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 derived from them. A section will also be devoted to the history of counter-insurgency warfare.

**References**

- Black, J. (2004). *Rethinking Military History*. London: Routledge.  
 Calvocoressi, P., Wint, G. and Pritchard, J. (1999). *The Penguin History of the Second World War*. London: Penguin.  
 Holmes, Richard, and Martin Marix Evans. (2007). *Decisive Conflicts in History*. Oxford: Oxford University Press.  
 Keegan, John. (1995). *The Face of Battle*. London: Viking Publications.  
 Townshend, C. (ed.). (2005). *The Oxford History of Modern War*. Oxford: Oxford University Press.

**DUS2012 MILITARY LAW**

The aim of the course is to provide the students with the basic foundation knowledge of military law. Armed Forces Act 1972 and other related documents will be the basic reference documents for this course. Students will initially be taught the various laws, regulations and procedures before being exposed to the various practical applications of the law through discussions, exercises and class assignments.

**References**

- Armed Forces Act 1972  
 Armed Forces Field Punishments Regulations 1976  
 Armed Forces Board of Inquiry Rules 1976  
 Armed Forces Summary Jurisdiction Regulations 1976  
 Manual of Malaysian Armed Forces Military Law, Kuala Lumpur: International Law Book Services, 1994.  
 P. Suppiah, Malaysian Military Law, Kuala Lumpur: Malaysian Law Publishers Sdn. Bhd., 1983

**DUS 2022 INTRODUCTION TO STRATEGIC STUDIES**

The aim of the course is to expose students to the various concepts in the area of strategic studies such as military powr, 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, students would also be introduced to modern principles of war and teachings of selected Western and Oriental strategic thinkers.

**References**

- Baylis, John, *et al.* (2007). *Strategy in the Contemporary World*, 2<sup>nd</sup>. Ed., Oxford: Oxford University Press.  
 Freedman, Lawrence (Ed.) (1994.) *War*. Oxford: Oxford University Press.  
 Mahnken, Thomas & Maiolo, Joseph, A. (2008). *Strategic Studies: A Reader*. London: Routledge.  
 Paret, Peter (Ed.). (1986). *Makers of Modern Strategy from Machiavelli to the Nuclear Age*. Oxford: Oxford University Press.  
 Williams, Phil, Donald Golstein, Jay Shafritz. (2006). *Classic Readings of International Relations*, 3<sup>rd</sup> Ed. Fort Worth: Harcourt Brace.



## **DUS 2052 LAWS OF ARMED CONFLICT**

The subject is designed to introduce students to the laws of war - covering both wars in conventional setting as well as non-conventional setting. 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. Although the focus of the subject will be the four Geneva Conventions of 1949 and the three Additional Protocols introduced in 1977 and 2005. Other relevant conventions and customary laws will also be covered.

### **References**

- 1949 Geneva Convention I for the Amelioration of the Wounded and Sick in the Armed Forces in the Field
- 1949 Geneva Convention II for the Amelioration of Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea
- 1949 Geneva Convention III Relative to the Treatment of Prisoners of War
- 1949 Geneva Convention IV Relative to the Protection of Civilian Persons in Time of War
- Protocol Additional to the Geneva Convention 1949, Relating to the Protection of Victims of International Armed Conflict (Protocol I)
- Protocol Additional to the Geneva Convention 1949, Relating to the Protection of Victims of Non-International Armed Conflict (Protocol II)
- 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

## **LAN 1012 TAMADUN ISLAM DAN TAMADUN ASIA**

Kursus ini memberikan pendedahan kepada pelajar secara umum mengenai tamadun dan pencapaian umat Islam sedunia serta tamadun Cina dan India. Kajian-kajian dan perbincangan akan menilai dan menganalisa sejarah ahli akademik, saintis dan ahli falsafah Islam. Prinsipal dan pemikiran mereka yang telah mempengaruhi pembangunan tamadun dan pencapaian umat Islam akan juga dianalisa.

*The course will provide the students with a broad overview of the Islamic civilisation and achievements, along with the civilisations of the Chinese and Indians. The approach will be historical where the works of various Islamic scholars, scientists and philosophers will be analysed. The focus of the study will be on the underlying principles and thoughts that underpin and influence the development of the civilisation, its achievements and the universal values that they promote.*

### **References**

- Azhar Hj Mad. Aros. (2007). *Tamadun Islam dan Tamadun Asia (TITAS) Kertas 1 dan 2*. Selangor: Penerbit Oxford Fajar.
- Mahayudin Yahaya. (1999). *Tamadun Islam*. Selangor: Penerbit Fajar Bakti.
- Nasrudin Yunos, et al. (2007). *Pengajian Islam*. Selangor: Penerbit Oxford Fajar.
- Sivachandralingam Sundara Raja. (2005). *Tamadun Dunia*. Selangor: Penerbit Fajar Bakti.
- Tamadun Islam Tamadun Asia*. (2006). Kuala Lumpur: Penerbit Universiti Malaya

### **LAN 1022 KENEGARAAN MALAYSIA**

Kursus ini memberikan pendedahan kepada pelajar mengenai konsep kenegaraan yang mencakupi bidang politik, fahaman dan budaya pelbagai kaum di Malaysia. Perbincangan akan di buat dengan menggunakan fakta-fakta sejarah yang akan menekankan perjuangan untuk mencapai kemerdekaan, masyarakat majmuk, sistem demokrasi, perlembagaan kebangsaan, ideologi kebangsaan dan sebagainya.

*The course exposes students to the concepts of nationhood by looking at politics and ideology and the culture of different ethnic groups in Malaysia. It is based on historical perspectives which emphasis on topics such as struggle for independence, plural society, democratic system, national constitution, national ideology, national unity and national development policy.*

#### **References**

- Abdul Aziz Bari. (2003). *Perlembagaan Malaysia: Asas-asas dan Masalah*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
- Asnarulkhadi Abu Samah dan Jayum A. Jawan. (1997). *Kenegaraan Malaysia*. Serdang: Penerbit Universiti Putra Malaysia.
- Konsep Pembangunan dan Kenegaraan Malaysia*. (1992). Bangi: Pusat Pengajian Umum, UKM.
- Nazaruddin Haji Mohd Jali, et al. (2003). *Malaysian Studies Nationhood and Citizenship*. Kuala Lumpur: Prentice Hall.
- Zulhilmi Paidi and Rohani Ab Ghani. (2003). *Kenegaraan Malaysia: Isu-isu dalam Pembinaan Negara*, Kuala Lumpur: DBP.

### **LAN 1032 HUBUNGAN ETNIK**

Kursus ini membincangkan mengenai hubungan etnik dan kaitannya dengan proses pembinaan bangsa, serta konsep asas budaya. Kursus ini juga membincangkan hubungan Malaysia dengan negara luar. Pelajar akan didedahkan dengan perbezaan masyarakat majmuk dan masyarakat pelbagai. Cabaran dan permasalahan di dalam hubungan etnik juga akan dibincangkan secara meluas tetapi terperinci.

*The course discusses ethnic relations and its relevance to nation-building and the fundamental concepts of culture. It also discusses the process of nation building and ethnic relations in other countries and the importance of ethnic relations in Malaysia. Students will be made to understand the differences between plural society and homogenous society. This is in order to create a Malaysian community based on our own mould and establish interaction with ASEAN as well as international communities. Students will also understand the challenges and the efforts in solving problems with regards to ethnic relations in Malaysia, Asia and at international levels.*

#### **References**

- Abraham, C. (2004). *The Naked Social Order: The Roots of Racial Polarisation in Malaysia*. Selangor: Pelanduk Publication.
- Cheah Boon Kheng. (1983). *Red Star over Malaya, Resistance Social Conflict During and After The Japanese Occupation, 1941-1946*. Singapore: Singapore University Press.
- Ratnam, K.J. (1965). *Communalism and The Political Process in Malaysia*. Kuala Lumpur: University Malaya.
- Shamsul Amri Baharuddin. (2007). *Modul Hubungan Etnik*. Shah Alah: Universiti Teknologi Malaysia.
- Vera, H & Feagin, J. R (eds). (2007). *Handbook of the Sociology of Racial and Ethnic Relations*. UK: Springer

### **LAN 1042 ASAS KEUSAHAWANAN**

Kursus ini membantu pelajar untuk mengenali konsep, praktis dan budaya keusahawanan. Pelajar akan di bantu untuk mengeksplorasi bidang keusahawanan dan di ajar untuk mengambil peluang keusahawanan. Mereka juga akan dibekalkan dengan latihan untuk menjadi lebih inovatif dan kreatif. Pendedahan mengenai risiko dan persaingan akan juga dibekalkan kepada pelajar.

*This course students to identify the concepts, practices and culture in entrepreneurship discipline. Students will be guided and nurtured to explore and tap the opportunities. They also will be trained to become more creative and innovative as well as to make them understand the aspects of risks, competitions and so on. They will be exposed to the process on how to start a business until they are able to expand their businesses by contributing to people around them.*

### **References**

- Ab. Aziz, Y. (2003). *Prinsip Keusahawanan*. Petaling Jaya: Prentice Hall
- C.H.Hoe et al. (2005). *Asas Keusahawanan*. Singapore: Thomson
- Farok Zakaria & Norsidah Ahmad. (1996). *Asas Keusahawanan*. Kuala Lumpur: Biroteks.
- Kementerian Pengajian Tinggi. (2007). *Asas Pembudayaan Keusahawanan*. Kedah: Penerbit Universiti Utara Malaysia.
- Rosli Mahmood, et al. (2007). *Prinsip-prinsip Asas Keusahawanan*. Kuala Lumpur: Thomson.

### **LEL 1012 ENGLISH FOR ACADEMIC WRITING**

Kursus ini bertujuan untuk menambah baik kemahiran menulis pelajar, terutama untuk kegunaan profesional. Kursus menitik beratkan laporan teknikal dan memo, kerjasama di dalam mesyuarat serta kemahiran untuk membaca dan memahami pelbagai tema bahan bacaan secara kumpulan atau individu.

*The course aims at improving the writing skill of students, especially for professional undertaking. The course exposes students to write technical report and memos, to participate in meetings as well as to read and listen to various theme-based articles in group and as an individual.*

### **References**

- Barnard, R. & Zemach, Dorothy E. (2004). *Writing for the Real World: An Introduction to General Writing*. Oxford: Oxford University Press.
- Fitzpatrick, Mary. (2005). *Engaging Writing: Paragraphs and Essays*. New York: Pearson Education.
- Kahn, John. E., et al. (1993). *How to Write and Speak Better*. London: The Reader's Digest Association Limited.
- Langan, Joe. (2000). *College Writing Skills*. Boston: McGraw-Hill.
- Shima, A. And Hogue, A. (2006). *Writing Academic English*. New York: Pearson Longman.

### **LEL 1022 ENGLISH FOR ORAL COMMUNICATION**

Kursus ini menumpukan kepada teknik mengeluarkan sebutan di dalam Bahasa Inggeris. Aspek-aspek pengeluaran sebutan ditumpukan dengan tujuan untuk meningkatkan keberkesanan komunikasi. Aspek-aspek seperti meningkatkan keyakinan diri, penggunaan alat bantu pembentangan dan sebagainya juga akan diberi penekanan. Pelajar akan mendapat latihan yang secukupnya di dalam kursus ini untuk tujuan komunikasi cemerlang.

*The course focuses on the techniques of producing good spoken discourses (oral presentation, speech and briefing) using the English sound and speech systems. Aspects of sound production and speech production aim at improving intelligibility and communication competence. It will also incorporate aspects of confidence building, visual aids preparation and audience handling. Students will have substantial practice in speech delivery.*

### **References**

- Byrd, P. & Murphy, J. (2005). *Essentials of Teaching Academic Oral Communication*. Wilmington, MA: Houghton Mifflin Harcourt.
- Ho Sook Wah, et al. (1998). *Interactively Speaking*. Serdang: UPM Press.
- Lucas, S.E. (2007). *The Art of Public Speaking*. Boston: McGraw Hill.
- McKenna, C. (1998). *Powerful Communication Skills: How to communicate with confidence*. New Jersey: Career Press.
- Young, S. K. & Travis, H.P. (2007). *Oral Communication: Skills, Choices and Consequences*. Illinois: Waveland Press, Inc.

Kursus BAHASA ASING yang ditawarkan adalah seperti berikut:

KOD	KURSUS
LFL 1112	Arabic I
LFL 1212	Arabic II
LFL 1122	Japanese I
LFL 1222	Japanese II
LFL 1132	Mandarin I
LFL 1232	Mandarin II
LFL 1142	Rusian I
LFL 1242	Rusian II
LFL 1152	French I
LFL 1252	French II
LFL 1162	Spanish I
LFL 1262	Spanish II

(Sinopsis kursus boleh dirujuk dalam bahagian Pusat Pengajian Umum dan Bahasa)

2)

**SENARAI KURSUS TERAS FAKULTI (18 KREDIT)  
FAKULTI KEJURUTERAAN**

Wajib diambil oleh semua pelajar program kejuruteraan.

KOD	KURSUS TERAS FAKULTI (18 KREDIT)	KREDIT
EFA 1103	Engineering Mathematics I (Calculus and Linear Algebra)	3
EFA 1203	Engineering Mathematics II (Differential Equation and Transform)	3
EFA 2213	Engineering Mathematics IV (Statistics)	3
EFC 1103	Computing I (C and C++)	3
EFC 1203	Computing II (Numerical Methods and Engineering Softwares)	3

Wajib diambil oleh pelajar Program Sarjana Muda Kejuruteraan Elektrik Dan Elektronik (Komunikasi)(ZK25), Sarjana Muda Kejuruteraan Elektrik Dan Elektronik (Kuasa)(ZK50) dan Sarjana Muda Kejuruteraan Mekanikal (ZK08)

KOD KURSUS	KURSUS TERAS FAKULTI (3 KREDIT)	KREDIT
EFA 2103	Engineering Mathematics IIIA (Complex Variable and Vector)	3

Wajib diambil oleh pelajar Program Sarjana Muda Kejuruteraan Awam (ZK01)

KOD KURSUS	KURSUS TERAS FAKULTI (3 KREDIT)	KREDIT
EFA 2203	Engineering Mathematics IIIB (Computer Information Systems and Operations Research)	3

**SINOPSIS KURSUS**

**EFA 1103 ENGINEERING MATHEMATICS I (CALCULUS III AND LINEAR ALGEBRA)**

This course has been designed to extend the ideas of single-variable calculus (example: differentiation and integration) to functions of several variables. Students will continue their study of the calculus of space. Topics include multi-variable functions, partial differentiation, multiple integrals, line integrals, Green's theorem, Stokes' theorem, Gauss theorem and introduction to differential equations. These concepts are extremely important in the sciences and engineering. Throughout the course real-world problems will be solved using the material learned.

**References**

Gerald L. Bradley & Karl J. Smith. Prentice Hall (1999). *Calculus, Second Edition*.  
James Stewart. Thomson, Brooks/Cole(2003). *Calculus, Fifth Edition*.  
Weir, Hass, Giordano. Pearson (Addison Wesley)(2005). *Thomas' Calculus, Eleventh Edition*.

**EFA 1203 ENGINEERING MATHEMATICS II (DIFFERENTIAL EQUATIONS AND TRANSFORM)**

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. Application in engineering also included in this course.

### **References**

- William E. Boyce, Richard C. DiPrima. (2005). *Elementary Differential Equations and Boundary Value Problems*. John Wiley & Sons.
- Erwin Kreyszig. (2006). *Advanced Engineering Mathematics*. John Wiley & Sons.
- Dennis G. Zill. (2004). *Differential Equations with Modeling Application*. Brooks Cole.

### **EFA 2103 ENGINEERING MATHEMATICS IIIA (COMPLEX VARIABLE AND VECTOR)**

This Mathematic course is to provide understanding of vector and complex numbers. Topics that are included are Eigen vector value, Scalar and vector product, vector as one order tensor, vector function, complex numbers, complex functions, complex integration, complex matrices, quadratic form and diagonal matrices and Cayley-Hamilton theorem.

### **References**

- Ali Hassan Mohamad Murid. *Complex Variables for Mathematics, Science, and Engineering*. Universiti Teknologi Malaysia, 2007.
- James Ward Brown, Ruel V. Churchill. *Complex Variables and Application*. (8th ed.). McGraw Hill, 2009.

### **EFA 2203 ENGINEERING MATHEMATICS IIIB (COMPUTER AND INFORMATION SYSTEMS AND OPERATIONS RESEARCH)**

(refer to Faculty and the Department)

### **EFA 2213 ENGINEERING MATHEMATICS IV (STATISTICS)**

The course covers topics from types of data, describing data sets graphically and numerically, discrete and continuous random variables and distributions to building confidence intervals and hypothesis testing. The course continues with analysis of variance (ANOVA), regression and correlation analysis, and categorical data analysis using chi-squared test. Students also will be introduced to different methods of design and analysis of experiments. This course will focus more on the procedures of the analysis and interpretation of results. Software application is highly recommended.

### **References**

- Hayter, A.J (2007). *Probability and Statistics for Engineers and Scientists*. 3rd ed. Thomson.
- Mohd Daud, Z. et al (2005). *Statistics Workbook for Sciences and Engineering*. Jabatan Matematik, Fakulti Sains, UTM.
- Montgomery, D.C., Runger G.C & Hubele, N.F. (2004). *Engineering Statistics*. 3rd ed. New York: John Wiley & Sons.

### **EFC 1103 COMPUTING I (C AND C++)**

The purpose of this subject is to provide knowledge, understanding and potentiality in computer programming. This course includes computer system and its utilization in engineering works, and also programming concept and language. This course will utilize programming language C (C++). Students will be exposing to *Graphic User Interface*. This course is compulsory for all Engineering Faculty students dan it is a pre-requisite for all courses that involved computer modeling.

### **References**

- Brown S. 1999. *Visual Basic 6 in Record Time*. Alameda USA: Sybex Inc.
- Kernigham B. W. & Rithcie D. M. 1998. *The C Programming Language*. 2<sup>nd</sup> Edition. New York: Prentice-Hall.
- Microsoft. 1995. *Visual C++ Tutorials*.
- Pohl I. 1994. *C++ for Programmers*. 2<sup>nd</sup> Edition. New York: Addison-Wesley.
- Stroustrup B. 1991. *The C++ Programming Language*. 2<sup>nd</sup> Edition. USA: Addison-Wesley Longman.

## **EFC 1203 COMPUTING II (NUMERICAL METHODS AND ENGINEERING SOFTWARES)**

This course has been designed to expose students on the theory and application of numerical approximation techniques. Familiarity with the fundamentals of matrix algebra and differential equations are useful. The course also introduced modern approximation techniques; to explain how, why, when they can be expected to work; and to provide a foundation for further study of numerical analysis and scientific computing. Students will be introduced to different algorithms. Most of the programming systems will need software, such as, C, Fortran, Pascal, Maple, Mathematica, and MATLAB.

### ***References***

- F.B.Hilderbrand, (1987) *Introduction to Numerical Analysis, 2<sup>nd</sup> Edition*, Unabridge Dove.  
Richard L.Burden, J.Douglas Faires, (2005). *Numerical Analysis, 8<sup>th</sup> Edition*, Thomson Brooks/Cole.  
Richard W.Hamming, (1986). *Numerical Methods for Scientists and Engineers, 2<sup>nd</sup> Edition*, Unabridge Dover.

### 3)

#### SINOPSIS KURSUS TERAS PROGRAM SARJANA MUDA KEJURUTERAAN MEKANIKAL

##### **EEE1012 INTRODUCTION TO ELECTRICAL ENGINEERING**

This course will introduce student to basic principles of Electrical Engineering which are cover the circuit analysis (resistive, capacitive, and inductive circuit), circuit theorems, and dc transient. Introduction of power switching in single and three phase application are concerned in this subject as well. Students are also exposed to topic on magnetic circuit, transformer, calculation on electrical power and introduction to electrical machine (DC and AC machine) where are much related to mechanical application.

##### **References:**

Rizzoni, G. (2009). *Fundamental of Electrical Engineering*, 1<sup>st</sup> Ed. McGraw –Hill Higher Education  
Nilssonand Riedel (2008). *Electric Circuits*, 8<sup>th</sup> Ed. Prentice Hall.  
Paul Gill (2009). *Electrical Power Equipment Maintenance and Testing*, Second Edition, CRC Press LLC  
Milenko Braunovic , Nikolai K. Myshkin , and Valery V. Konchits (2007). *Electrical Contacts  
Fundamentals, Applications and Technology*,CRC Press LLC  
Edited by Robert H. Bishop (2002), *The Mechatronics Handbook - 2 Volume Set*, CRC Press LLC  
Jerry C. Whitaker (2001), *Fundamental Electrical Properties*, CRC Press LLC

##### **EEE 2022 ELECTRONICS**

*Pre-requisite: EEE1012 Introduction to Electrical Engineering*

This is an introduction to Electronic field to Mechanical Engineering based programs. It covers on 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 basic analogue devices along with its characteristics and applications. In digital electronics, it covers on the digital devices, its logic circuits and systems used in applications. Lastly, in microcontroller, it covers on the overview of microcontroller based system, including architectures, applications and assembly language.

##### **References:**

Floyd, (2008) *Electronic Devices Conventional Current Version*, 8<sup>th</sup> Ed, Pearson.  
Boylested R.L. Nashelsky L., (2006) *Electronic Devices and Circuit Theory*, 9<sup>th</sup> Ed, Pearson.  
Floyd, (2008) *Digital Fundamentals*, 10<sup>th</sup> Ed, Pearson.  
Bignell J. W. & Donovan R., (2007) *Digital Electronics*, 5<sup>th</sup> Ed, Thomson.  
Spasov P. (2004) *Microcontroller Technology (68HC11)*, 5<sup>th</sup> Ed, Prentice Hall.

##### **EMP 1102 TECHNICAL DRAWING**

This course introduces the student to the use of technical drawing in engineering communication and the engineering design process. Geometric drawing, sinusoidal, parabolic, involute cycloidal and elliptical curves. Orthographic projections. Development of surfaces. Isometric views.

##### **References**

Giesecke, Mitchell, *et al. Technical Drawing*, 12<sup>th</sup> Ed., Pearson Edition.  
Morling, K. *Geometric And Engineering Drawing*, Arnold.

##### **EMP 1111 WORKSHOP PRACTICES**

This course will introduce students to engineering workshop production processes and safety. Students will be exposed to basic manufacturing technology followed by practical operations of some commonly used manufacturing machines and tools. Students will be supervised to have hands-on experience in sheet metal working, casting and operate machines such as welding, lathe, milling, drilling and grinding machine. At the completion of the course, students will have some experience translating engineering drawing into products via individual and small group fabrication projects to produced simple engineering work.



## References :

*Manufacturing Processes for Engineering Materials*, 4th ed. Kalpakjian • Schmid. Prentice Hall, 2003  
*Materials and Process in Manufacturing*, 10<sup>th</sup> ed., Degarmo, Black and Kohser, John Wiley, 2007  
*Workshop Technology*, Part 1, 2 & 3. 5th ed. W. Chapman. Elsevier, 1972  
Chapman W. A. J., *Workshop Technology* Parts 1 & 2, 4<sup>th</sup> Edition, Viva Books P.Ltd., New Delhi, 1998.  
Tuplin W. A., *Modern Engineering Workshop Practice*. Odhams Press, 1996

## EMP 1152 ENGINEERING DRAWING

*Pre-requisite:* EMP1102 Technical Drawing

This course is a continuation of EMP 2102. The course will enlighten the students on the significant changes in the engineering and technical graphics using computers and CAD (Computer Aided Design) software. It is also to enhance student knowledge and understanding on technical drawing as a tool for communication and exchange of information. At the end of the course, students should be able to apply the skill and knowledge of engineering drawing to interpret or produce design using CAD as a graphics method and creating 3D modeling.

### References

Rooney J and Steadman P. *Principles of Computer Aided Design*. UCL Press/Open University  
David C. Planchard and Marie P. Planchard (Nov 2009). *A Commands Guide Tutorial for Solidworks 2010: A Comprehensive Reference Guide With over 230 Tutorials*. Schroff Development Corp (SDC)  
David C. Planchard and Marie P. Planchard (April 2010). *Drawing and Detailing With Solidworks 2010*. Schroff Development Corp (SDC)  
David C. Planchard and Marie P. Planchard (Jan 2010). *Engineering Design With Solidworks 2010: A Step-by-step Project Based Approach Utilizing 3d Solid Modeling*. Schroff Development Corp (SDC)  
David C. Planchard and Marie P. Planchard (Feb 2010). *Solidworks 2010 Tutorial*. Schroff Development Corp (SDC).

## EMM 1203 ENGINEERING MECHANICS (STATICS)

This course is based on Newton's first and third laws of motion. It covers the basic concepts of forces and moments, and the application of equilibrium conditions to determine transmitted loads and support reactions. Applications will include analyses of trusses, frameworks, and machine structures, with a strong emphasis on the use of free body diagrams. Properties of plane areas, beam loading and an introduction to friction will also be covered.

### References

Beer F.P. and Johnston E.R. *Vector Mechanics for Engineers – Statics*, Second S.I. Metric Edition, Mc Graw-Hill.  
Hibbeler R.C. *Engineering Mechanics – Statics*, S.I. Edition, Prentice-Hall.  
Meriam J.L. and Kraige L.G. *Engineering Mechanics – Statics*, Fourth Edition, John Wiley and Sons, Inc.

## EMM 1223 DYNAMICS

*Pre-requisite:* EMM1203 Engineering Mechanics (Statics)

A study of particles and rigid bodies in motion. The study focuses on the fundamental concepts and principles of kinematics, the geometry of motion, and kinetics of planar motion. Various methods of velocity and acceleration analyses will be introduced. The application of Newton's second law of motion, impulse-momentum, and work-energy equations to the analysis of particle and rigid body motions will be clearly described. Emphasis will be placed on a strong mastery of the pertinent concepts of dynamics, since these form the main basis for machine design.

### References

Beer F.P. and Johnston E.R. *Vector Mechanics for Engineers – Dynamics*, Second S.I. Metric Edition, McGraw-Hill.  
Hibbeler R.C. *Engineering Mechanics – Dynamics*, S.I. Edition, Prentice Hall.  
Meriam J.L. and Kraige L.G. *Engineering Mechanics Volume 2 – Dynamics*, 4th Editions, John Wiley and Sons, Inc.  
Mohamad, A.Ghani. *Mekanik Badan Tegar – Dinamik*, Cetakan ke 2, Unit Penerbitan Akademik UTM.

## EMM 2303 STRENGTH OF MATERIALS I

*Pre-requisite:* EMM1203 Engineering Mechanics (Statics)

An introduction to the concepts of stress and strain, and the application of these concepts to various loading conditions. Cases studied include direct, shear, torsional, flexural and combined loading conditions. Axial loading of struts. Plane stress systems and Mohr's circle for stresses.

### References

Benham, P.P. and Crawford, R.J. *Mechanics of Engineering Materials*, Longman.

Gere, J.M. and Timoshenko, S.P. *Mechanics of Material*, Thomson.  
Hibbeler, R.C. *Mechanics of Material*, Prentice Hall.

### **EMM2173 MATERIAL ENGINEERING**

This subject introduces the basic principles of materials engineering stressing the relationship between internal structures to mechanical properties, the effects of alloying and material processing on properties, some common engineering materials and the selection of materials for design.

#### **References:**

Callister, W.D., 2007, *Materials Science and Engineering*, 7<sup>th</sup> ed., John Wiley & Sons.  
Smith, W.F., 1999, *Principles of Materials Science and Engineering*, 2<sup>nd</sup> Ed., McGraw Hill.  
Askeland, D.R., 2003, *The Science and Engineering of Materials*, PWS – Kent Pub. Comp. USA.  
Shakelford, J.F., 2000, *Intro to Materials Science for Engineers*, 5<sup>th</sup> Ed., Prentice Hall.  
Budinski, K.G., Budinski, K.M., 2002, *Engineering Materials, Properties and Selection*, 7<sup>th</sup> Ed., Prentice Hall.  
Farak Material selections  
Ashby “Materials Selection”

### **EMM 2503 THERMODYNAMICS I**

A study of the fundamental concepts and laws of classical thermodynamics and their application to practical devices such as engines and refrigeration systems. The first and Second Laws of Thermodynamics are studied in detail, and applied to gases and two phase mixtures used in the devices studied. The lectures are supplemented by problem assignment and experiments in the laboratory periods.

#### **References**

Cengel, Y. A. & Boles, M.A.. *Thermodynamics An Engineering Approach*, 6<sup>th</sup> Ed., McGraw Hill Higher Education.  
Moran, M.J. & Shapiro, H.N. Shapiro. (2004) *Fundamentals of Engineering Thermodynamics*, 5<sup>th</sup> Edition, Wiley.  
Roger, G.F. & Mayhew, Y.R. *Engineering Thermodynamics, Work and Heat Transfer*.  
Sonntag and Borhnake. (2003) *Fundamentals of Thermodynamics*, 6<sup>th</sup> Edition, John Wiley and Sons.  
Van Wylen, G.J. & Sontag, R.E. *Fundamentals of Classical Thermodynamics*.

### **EMM 2603 FLUID MECHANICS I**

*Pre-requisite: EMM1203 Engineering Mechanics (Statics)*

This course emphasizes on the basic concepts and principles of fluid statics and dynamics. The course includes a study of fluid properties, pressure on submerged surfaces and bodies, fundamental equations of fluid motion, control volume concept applied to the continuity, momentum, and energy equations, the Euler and Bernoulli equations. Similitude and dimensional analysis; incompressible and viscous flows will also be covered.

#### **References**

Douglas, J.F., Gasiorek, J.H., et al. *Fluid Mechanics*, ELBS London.  
Munson, B.R., Young D.F., et al. *Fundamentals of Fluid Mechanics*, John Wiley & Sons.  
White, F. *Fluid Mechanics*, 5<sup>th</sup> Ed., McGraw-Hill.

### **EMM 3503 THERMODYNAMICS II**

*Pre-requisite: EMM2503 Thermodynamics I*

An extension of EMM 2503, this course is designed to further 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 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 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 mixtures and gas-vapour mixtures. The students should also be able to define exergy and examine the performance of engineering devices in light of the second law of thermodynamics.

#### **References**

Cengel, Y. A. & Boles, M.A. *Thermodynamics An Engineering Approach*, 6<sup>th</sup> Ed., McGraw Hill Higher Education.  
Moran, M.J. & Shapiro, H.N. Shapiro. (2004) *Fundamentals of Engineering Thermodynamics*, 5<sup>th</sup> Edition Wiley,  
Roger, G.F. and Mayhew, Y.R. *Engineering Thermodynamics, Work and Heat Transfer*.  
Sonntag and Borhnake. (2003) *Fundamentals of Thermodynamics*, 6<sup>th</sup> Edition, John Wiley and Sons/  
Van Wylen, G.J. & Sontag, R.E. *Fundamentals of Classical Thermodynamics*.

## **EMM 3303 STRENGTH OF MATERIALS II**

*Pre-requisite: EMM2303 Strength of Materials I*

This course is a continuation of EMM 2303 to cover more difficult cases including unsymmetrical bending, bending of curved beams. Mohr circle for planar stresses and strains. Three dimensional stress systems. Mohr's circle for three-dimensional stress systems. Determination of principle stresses. Buckling of strut and columns. Thin and thick-walled cylinders.

### **References**

Beer, F.P. and Johnston, E.R. *Mechanics of Materials*, McGraw-Hill.  
Benham, P.P., Crawford, R.J. & Armstrong, C.G. *Mechanics of Engineering Materials*, Addison-Wesley.  
Gere, J.M., and Timoshenko, S.P. *Mechanics Of Materials*, Thomson  
Hibbeler, R.C. *Mechanics of Materials*, Prentice Hall.  
Lardner, T.J. and Archer, R.R. *Mechanics of Solids*, McGraw-Hill.

## **EMM 3603 FLUID MECHANICS II**

*Pre-requisite: EMM2603 Fluid Mechanics I*

Applies basic principles of fluid mechanics to problem in viscous and compressible flow. Flow kinematics, classical hydrodynamics. Application of Navier Stokes equation to incompressible, inviscid flows. Boundary layer theory. Ideal fluid flow field analyses. The use of field analysis techniques for ideal and viscous fluids in the design of fluid machines such as pump and turbines. Principle operations of turbomachines, method of selections, applications, characteristics and performance. Compressible flow, mach number, Prandtl-Meyer function. Turbulence.

### **References**

Douglas, J.F., Gasiorek, J.H., *et al.* *Fluid Mechanics*, ELBS London.  
Munson, B.R., Young D.F., *et al.* *Fundamentals of Fluid Mechanics*, John Wiley & Sons.  
White, F. *Fluid Mechanics*, 5<sup>th</sup> Ed., McGraw-Hill.

## **EMP3113 MANUFACTURING TECHNOLOGY**

*Pre-requisite: EMP1111 Workshop Practices*

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-tradition 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, laboratory practice and 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.

### **References:**

Kalpakjian S., Schmid S. (2006), *Manufacturing Engineering and Technology*, Fifth Edition, Pearson Prentice Hall.  
Kalpakjian, S. (2000), *Manufacturing Engineering and Technology*, 4<sup>th</sup> Edition, Addison Wesley  
Ostwald, F.P. and Munoz, J. (1997), *Manufacturing Processes and Systems*, 9<sup>th</sup> Edition, John Wiley  
Schey, J.A. (2000), *Introduction to Manufacturing Processes*, 3<sup>rd</sup> Edition, McGraw Hill  
Lindberg, R.A. (1990), *Processes and Materials of Manufacture*, 4<sup>th</sup> Edition, Prentice Hall  
Amstead, B.H. (1987), *Manufacturing Processes*, 8<sup>th</sup> Edition, John Wiley & Sons

## **EMM 3223 MECHANICS OF MACHINES AND VIBRATION**

*Pre-requisite: EMM1223 Dynamics*

This course requires EMM 1223 as the pre-requisite. It is designed to expose students to the application of concepts in mechanics (statics and dynamics) to solve real world mechanical engineering problems relating to various machines types including belt and pulley systems, gears, flywheels, governors and gyroscopes. Students will also be exposed to methods of balancing rotating masses and parts of combustion engine. The concept of vibration with respect to one-degree-of freedom is also studied. At the end of the course, the students should be able to solve problems related to various mechanical systems. In addition to that, they should be able to evaluate analytically the parameters of components of various machines under study.

### **References**

Wilson, C.E., and Sandler, J.P. *Kinematics And Dynamics of Machinery*, Prentice Hall.  
Shigley, J.E. Uicker, J.J. *Theory Of Machines And Mechanisms*, McGraw-Hill.

### **EMM 3314 LATIHAN INDUSTRI (INDUSTRIAL TRAINING)**

*Pre-requisite:* EMM3503, EMM3303, EMM3603, EMM3223

Industrial training exposed the 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 require 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 may be used later in final year class as well as to equip them with sufficient knowledge for their job.

### **EMM 3412 INSTRUMENTATIONS**

*Pre-requisite:* EEE 2022 Electronic

The course will emphasize on the concepts of instrumentation system, characteristics of instrumentation system, signal conditioning, transducers and application of strain gauges in load measurements. At the end of the course, students will gain knowledge on the basic principles of an instrumentation system, relate and describe the operating principle and application of various transducers that are typically used in industry, design instrumentation systems 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. EEE 3012 is a prerequisite to this course.

### **References**

C.D Johnson, *Process Control Instrumentation Technology*, 7<sup>th</sup> edition, Prentice Hall, 2003  
Thomas G. Beckwith, John H. Lienhard H., Roy D. Marangoni ; *Mechanical Measurement 6 edition*, Prentice Hall  
Alan S Morris, *Measurement and Instrumentation Principles 3<sup>d</sup> edition*  
D.G Alciatore & M.B Histand, *Introduction to Mechatronics and Measurement Systems 3<sup>rd</sup> edition*, Mc Graww Hill 2003

### **EMM 4193 OPERATION AND ENGINEERING MANAGEMENT**

The course introduces students to engineering management, to prepare them with basic management knowledge. This course will examine key issues in management and organization, management yesterday and today, foundations of planning, strategic management, organization structure and design, human resource management, leadership and day to day management of an engineering organization.. Among the topics covered are organizational structure, project management, quality management, maintenance management and reliability engineering and material resource planning. At the end of the course, students should be able to acquire fundamental aspect of management and integrate knowledge in engineering and management in making effective engineering management decisions.

### **References**

Heizer, J. and Render, B. (2006). *Operations Management*, 8<sup>th</sup> Edition, Pearson Prentice Hall, New Jersey  
Gray, F.G and Larson, E.W. (2006) *Project Management, The Managerial Process 4<sup>th</sup> Edition*, McGraw-Hill, International Edition  
Robins, S and Coulter, M (2007) *Management*, 9<sup>th</sup> Edition, Pearson Prentice Hall, New Jersey

### **EMM 4422 CONTROL ENGINEERING**

*Pre-requisite:* EMM1223 Dynamics, EEE2022 Electronics, EFA1203 Engineering Math II

A study of the mathematical modeling of dynamic behaviour of mechanical, thermal, fluid, and hybrid systems and their control. General concepts of control system design. Mathematical techniques. State equations, transfer function and frequency response. System stability. Linear feedback and optimal control. EMM 2213 and EFA 1203 are pre-requisites to this course.

### **References**

Kuo, B.S. *Automatic Control Systems*, Wiley.  
Ogata, K. *Modern Control Engineering*, Prentice-Hall.  
Shinners, S.M. *Modern Control Systems, Theory And Application*, Addison Wesley.

### **EMM 4433 COMPUTER AIDED ENGINEERING**

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.

**References:**

Ferziger, J. H. and Peric, M., *Computational Methods for Fluid Dynamics*, Springer, 1999  
Dante, A.W., "*Introduction to Computational Fluid Dynamics*", Cambridge University Press, 2005  
Chandrupatla T.R and Belegundu A.D, *Introduction to Finite Elements in Engineering*, 3rd edition, Prentice Hall Inc., 2002  
Saeed Moaveni, *Finite Element Analysis: Theory and Applications with ANSYS*, 2<sup>nd</sup> Ed., ISBN Prentice Hall, 2003  
John D Anderson, Jr., *Computational Fluid Dynamic*, Mc-Graw-Hill Int Edition 1995.

**EMM4502 HEAT TRANSFER**

*Pre-requisite: EMM3503 Thermodynamics II*

Heat transfer is a basic science that deals with rate energy transfer in the form of heat. This course introduces students to the basic principles of heat transfer. It will discuss basic concepts and introduces the various modes of heat transfer as well as thermal properties of materials. A general relation for the conservation of mass and energy principles will be developed and applied to systems that involved with convection heat transfer. The concepts of thermal resistance network will be developed for the analysis of heat flows due to conduction and radiation heat transfer.

**References:**

Y.A. Cengel, *Heat and Mass Transfer, A Practical Approach*, Third Edition in SI Units, McGraw-Hill, Singapore, 2007  
J.P.Holman, *Heat Transfer*, 10th ed., McGraw - Hill, New York ,2009  
F. P. Incropera ,*Introduction to Heat Transfer*, Wiley; 5 edition ,2006

**EML 2802 ENGINEERING LABORATORIES I**

Laboratory work

**EML 2812 ENGINEERING LABORATORIES II**

*Pre-requisite: EML2802 Engineering Laboratories I*

Laboratory work

**EML 3822 ENGINEERING LABORATORIES III**

*Pre-requisite: EML2812 Engineering Laboratories II*

Laboratory work

**EML 3832 ENGINEERING LABORATORIES IV**

*Pre-requisite: EML3822 Engineering Laboratories II*

Laboratory work

**EMT 4752 FINAL YEAR PROJECT I**

*Pre-requisite: EMD3703, EMM3223, EMM3303, EMM3503, EMM3603*

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 carry out literature survey in order to understand the nature of the problem and investigate work done by other researchers in line with their research. The course will also train students to plan and manage their work within a given time frame.

**References**

Student are expected to find their own reference materials.

### **EMT 4754 FINAL YEAR PROJECT II**

*Pre-requisite: EMT4752 Final Year Project I*

This course enhance the students knowledge and ability to identify and solve problem through academic research. It provides an opportunity for the student to carry out research with minimum supervision and to plan and manage their work effectively. This course will also develop the students capability to present, discuss and analyze research results clearly, effectively and confidently in an oral presentation as well as in a dissertation.

#### **References**

Students are expected to find their own reference materials.

### **EMD 3703 MECHANICAL ENGINEERING DESIGN**

*Pre-requisite: EMM1223 Dynamics, EMM3303 Strength of Materials II*

This course emphasize on the application of stress analysis, metallurgy, and engineering mechanics to the design of machine components. Failure theories for ductile and brittle materials. Fatigue failure of components under cyclic loading. Fracture. Applications include design of shafts, springs and welds. Selection of rolling element bearings. Hydrodynamic bearings.

#### **References**

Juvinall and Marshek *Fundamentals of Machine Component Design*.

Shigley, J.E. and Mischke, C.R. *Mechanical Engineering Design*, McGraw-Hill.

### **EMD 4713 CAPSTONE PROJECT**

*Pre-requisite: EMM3703 Mechanical Engineering Design*

A group design project that utilizes all the knowledge gained through the earlier courses. Students must work from the initial problem identification, specification, material selection, fabrication, right through to fabrication and assembly. A written report and presentation will be expected.

#### **References**

Students are expected to find their own references materials.

### **EMM 4902 ENGINEERS IN SOCIETY**

This subject has been designed to accommodate the "Engineers in Society" syllabus of the institute of Engineers (Malaysia). The subjects will comprise a wide range of management theories and practices including human resource management, marketing, organizations theory and communication. Students will be briefly introduce to the concept of financial management and engineering economy. Concepts of ethics, inclusive of engineer's code of ethic, sustainable development and law of contracts will be covered to prepare graduates for their future roles as professionals and members of society. Students will be exposed to seminars delivered by invited professionals who will talk about their professions. At the end of the course, students should be able to demonstrate and apply the engineering professional ethics in their career as an engineer.

#### **References**

Materials from different sources will be provided and identified.

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**SINOPSIS KURSUS ELEKTIF PROGRAM  
SARJANA MUDA KEJURUTERAAN MEKANIKAL**

**EME 4233 SYNTHESIS AND ANALYSIS OF MECHANISMS**

Mobility and number synthesis of linkage mechanisms. Dimensional synthesis for Function, motion and path generation. Cam profile synthesis. Generation of Cam profiles for simple harmonic, parabolic and polynomial follower motions. Design of multispeed gear box.

**References**

Shigley, J.E., and Uicker, J.J. *Theory Of Machines An Mechanisms*, McGraw-Hill.  
Wilson, C.E., and Sadler, J.P. *Kinematics And Dynamics of Machinery*, Prentice Hall.

**EME 4623 TURBOMACHINERY**

Revision of fundamentals. Types of turbomachines and their applications. Dimensional analysis and performance parameters. Cascade theory : types of cascades, flow and geometric parameters, boundary layer development. Axial flow turbines and compressors. Diffusers and nozzles.

**References**

Dixon, L. *Fluid Mechanics And Thermodynamics Of Turbomachinery*, Butterworth Heinemann.

**EME 4613 FLUID POWER SYSTEMS**

The design and analysis of industrial fluid power systems. Hydraulic systems ; Basics and Symbols. Pump, motors and power packs. Direction control and flow control valves. Servos and actuators. Design and analysis of hydraulic circuits. Pneumatic systems ; Generation and distribution of compressed air. Design and construction of pneumatic circuits.

**References**

Esposito, A. *Fluid Power With Applications*, Prentice Hall.  
Johnson, J.L. *Introduction To Fluid Power*, Thomson Learning.

**EME 4523 AIR-CONDITIONING AND REFRIGERATION**

The importance of refrigeration system and air conditioning system in domestic, commercial and industrial sectors for both comfort and process applications cannot be over emphasized. Advances in electronics, communications, computers, medicine and etc. demand stringently controlled air conditioning system. Food refrigeration from small domestic refrigerators to large cold storages is important to avoid spoilage, thus prolonging its shelf life. Therefore, refrigeration and air conditioning system play an important role in this modern world. The syllabus comprises of ; Introduction, Vapour Compression Refrigeration Cycle, Refrigerants, Properties of air and mixture of liquid and air, Psychometric processes, Introduction to air-conditioning system, type of air-conditioning unit, comfort zone, cooling/heating load calculation and design of air-conditioning duct.

**References**

Arora, C.P. *Refrigeration and Air Conditioning*, 2<sup>nd</sup> Ed., McGraw Hill.  
Eastop, T.D. and McConkey, A. *Applied Thermodynamics for Engineering Technologists*, 5<sup>th</sup> Ed., Longman Scientific & Technical.

**EME 4343 SHIP DESIGN AND STRUCTURES**

This subject introduces the basic knowledge on principles and theory related to basic engineering in ship design for engineering students. This course provides knowledge about the types of ship hull, strength, structure and material of ship hull, basic ship design drawing and basic calculation on the ship stability, resistance and powering. On completion of the course, the student should be able to determine the types of ship's hull, determine basic concept in designing and constructing a ship, calculate the metacenter height, righting moment, trim, ship resistance and powering.

**References**

Gillmer, T.C. and Johnson, B. (1982) *Introduction to Naval Architecture*, Naval Institute Press, Maryland.

Tupper, E. (1996) *Introduction to Naval Architecture*, 3<sup>rd</sup> Edition, The Society of Naval Architects and Marine Engineers.

Zubaly, R. (1996) *Applied Naval Architecture*, Cornell Maritime Press Inc, Maryland.

#### **EME 4553 MARINE ENGINEERING SYSTEM**

This subject introduces the basic knowledge on application of Marine Engineering System onboard ships. All the machinery items found in a ship are described in simple terms and their working principles and operation explained.

##### **References**

Blank, D. and Bock, A.E. (1985) *Introduction to Naval Engineering*, 2<sup>nd</sup> Edition, United States Naval Institute, Maryland.

Griffiths, D. (1999) *Marine Medium Speed Diesel Engines*, Marine Engineering Practice Series, Vol 1, Part 3, The Institute of Marine Engineers.

Morgan, N. (1990) *Marine Technology Reference Book*, Butterworth & Co. Ltd.

#### **EME 4193 SHIP MAINTENANCE SYSTEM**

This subject introduces the basic knowledge of maintenance practice and refit procedures for engineering students who are to work in the Navy and ship maintenance industries. The subject contains brief introduction to general principle of maintenance, technical documentation, ship maintenance system procedure and ship refit procedure.

##### **References**

BRL 1985 : *RMN Maintenance System*, 1985.

BRL 1910 : *Panduan Pengurusan Senggaraan Berjadual Kapal di Limbungan*, 2002

Caridis, P.A. (2001) *Inspection, Repair and Maintenance of Ship Structures*, Witherby & Co Ltd, London.

Dhillon, B.S. (2002) *Engineering Maintenance, A Modern Approach*, CRC Press LCC Boca Raton, Florida.

#### **EME 4163 COMPOSITE MATERIAL**

Please refer to Faculty.

#### **EME 4603 COMPUTATIONAL FLUID DYNAMICS**

Please refer to Faculty.

#### **EME 4923 TRIBOLOGY**

Please refer to Faculty.

#### **EME 4913 NON-DESTRUCTIVE TESTING**

Please refer to Faculty.

#### **EME 4533 INTERNAL COMBUSTION ENGINE PERFORMANCE**

Please refer to Faculty.

#### **EME 4243 VEHICLE DYNAMICS AND HANDLING**

Please refer to Faculty.

#### **EME 4323 VEHICLE SYSTEM AND STRUCTURE**

Please refer to Faculty.

#### **EME 4633 AERODYNAMICS AND FLIGHT MECHANICS**

Please refer to Faculty.

#### **EME 4333 AIRCRAFT SYSTEMS AND STRUCTURE**

Please refer to Faculty.

#### **EME 4543 AIRCRAFT PROPULSION**

Please refer to Faculty.



5)

**KURSUS ELEKTIF UNIVERSITI**

Semua pelajar Program Ijazah Sarjana Muda wajib melengkapkan lapan unit Kursus Elektif Universiti. Pegawai Kadet diwajibkan mengikuti 3 unit latihan ketenteraan (ALKXX12) manakala PALAPES diwajibkan mengikuti enam unit PALAPES (PLS10X1) dan dua unit ko-kurikulum. Pelajar awam bebas untuk memilih mana-mana kursus (atau latihan ko-kurikulum) yang ditawarkan untuk memenuhi keperluan lapan unit kursus elektif universiti, dengan sekurang-kurangnya dua unit kursus/latihan ko-kurikulum. Berikut merupakan senarai kursus Teras Universiti yang ditawarkan:

KOD KURSUS	KURSUS	KREDIT
<i>Untuk Pegawai Kadet</i>		
ALK 1014	Latihan Ketenteraan Umum	2
ALK 2014	Latihan Ketenteraan Umum	2
ALK 3014	Latihan Ketenteraan Umum	2
QKS 1621	Tempur Tanpa Senjata (Asas)	1
QKS 2621	Tempur Tanpa Senjata (Lanjutan)	1
QKS 3621	Tempur Tanpa Senjata (Penguukuhan Lanjutan)	1
<b>JUMLAH</b>		<b>15</b>

KOD KURSUS	KURSUS	KREDIT
<i>Untuk Pelajar Awam</i>		
QKX 1XX2	Co-curriculum	2
	Kursus Elektif	6
<b>JUMLAH</b>		<b>8</b>

KOD KURSUS	KURSUS	KREDIT
<i>Untuk PALAPES</i>		
PLS 1011	PALAPES	1
PLS 1021	PALAPES	1
PLS 1031	PALAPES	1
PLS 1041	PALAPES	1
PLS 1051	PALAPES	1
PLS 1061	PALAPES	1
QKX 1XX2	Co-curriculum	2
<b>JUMLAH</b>		<b>8</b>

**ALK1014 LATIHAN KETENTERAAN UMUM**

Di dalam modul ini pelajar akan mempelajari matapelajaran Tugas Staf dan Pengetahuan Am Ketenteraan. Kedua-dua matapelajaran ini adalah kesinambungan dari matapelajaran yang sama yang telah dipelajari semasa Tahun Asas.

- a) Tugas Staf – Matapelajaran ini member pengenalan terhadap Tugas Staf, peraturan penulisan dalam tentera, persuratan tentera, singkatan dan simbol tentera. Juga akan diterangkan di dalam matapelajaran ini ialah perintah amaran, laporan operasi dan taklimat tentera.
- b) Pengetahuan Am Ketenteraan – Matapelajaran ini akan menerangkan berkaitan prinsip-prinsip peperangan, jenis peperangan, operasi darat, operasi laut dan operasi maritime. Di dalam matapelajaran ini juga akan diterangkan berkaitan dengan operasi bersama ketiga-tiga perkhidmatan. Ianya juga akan menerangkan perkara berkaitan perisikan dan gerak saraf.
- c) Pentadbiran – Matapelajaran ini akan menerangkan prinsip pentadbiran dalam ATM, dasar perkhidmatan, peruntukan pakain dan catuan, Perintah Pasukan, dokumen pasukan dan aturcara pentadbiran pasukan. Matapelajaran ini juga akan menerangkan tentang Koperasi Tentera, Kursus Peralihan, pentadbiran di medan, pertolongan cemas dan kumpulan Wang Kebajikan ATM.
- d) Undang-undang Tentera – Matapelajaran ini akan menerangkan hal berkaitan Undang-undang Tentera yang meliputi pengenalan, orang yang tertakluk dengan Undang-undang Tentera, sumber perundangan, kesalahan dan hukuman. Matapelajaran ini juga akan menerangkan prosedur melapor dan menyempurnakan pertuduhan, tangkapan dan jagaan, perintah yang sah oleh Pegawai Atasan dan komander Rendah dan seterusnya pemulihan terhadap pengaduan.

**ALK2014 LATIHAN KETENTERAAN UMUM**

Di dalam modul ini pelajar akan mempelajari matapelajaran Tugas Staf dan Kaedah Mengajar. Matapelajaran Tugas Staf adalah kesinambungan dari matapelajaran yang sama yang telah dipelajari semasa Tahun 1.

- a) Tugas Staf – Di dalam matapelajaran ini pelajar akan didedahkan perkara berkaitan dengan agenda serta minit mesyuarat, penulisan semboyan, penyediaan kertas kerja perkhidmatan dan memo. Perkara yang berkaitan dengan symbol tentera juga akan ditekankan.
- b) Kaedah Mengajar – Matapelajaran ini akan menerangkan pengenalan kepada Kaedah Mengajar dan persediaan yang perlu dilakukan serta format rancangan mengajar. Matapelajaran ini juga akan menerangkan bentuk dan masalah berkaitan komunikasi di dalam pengajaran dan juga tanggungjawab sebagai pengajar. Di akhir modul, akan juga diterangkan penggunaan alat bantuan mengajar.
- c) Pengetahuan Am Ketenteraan – Matapelajaran ini menerangkan berkaitan pertahanan nuclear biologikimia, kategori operasi ATM, organisasi pemerintahan atasan, bantuan ATM semasa bencana alam dan jenis-jenis latihan dan eksekusi. Matapelajaran ini juga akan menerangkan perkara berkaitan sumber maklumat dan ilmu ikhtiar hidup.
- d) Gaji, Elaun dan Akaun – Di dalam matapelajaran ini akan diterangkan pengenalan terhadap gaji, elaun dan akaun perkhidmatan. Matapelajaran ini juga akan menerangkan tugas dan tanggungjawab bagi seseorang pemegang akaun serta pengendalian sesuatu akaun perkhidmatan dan seterusnya penerangan kepada sistem pengauditan sesebuah akaun perkhidmatan.

### **ALK3014 LATIHAN KETENTERAAN UMUM**

Di dalam modul ini pelajar akan mempelajari matapelajaran Undang-undang Tentera serta matapelajaran Gaji, Elaun dan Akaun. Matapelajaran Undang-undang Tentera adalah kesinambungan dari matapelajaran yang sama yang telah dipelajari semasa Tahun 1 manakala Gaji, Elaun dan Akaun adalah kesinambungan dari matapelajaran yang sama yang telah dipelajari semasa Tahun 2.

- a) Undang-undang Tentera – Matapelajaran ini akan mendedahkan prosedur bagi Perbicaraan Pegawai Memerintah dan Pegawai Pemerintah. Ianya juga akan menerangkan istilah berhubung Keterangan iaitu Ringkasan Keterangan dan Cabutan Keterangan. Di akhir modul, akan diterangkan prosedur Mahkamah Tentera dan perkara yang berkaitan dengannya.
- b) Gaji, Elaun dan Akaun – Matapelajaran ini akan menerangkan lebih mendalam tentang Akaun Perkhidmatan terutama dari segi pengendaliannya secara terperinci. Ianya juga akan menerangkan tatacara untuk mengaudit sesebuah Akaun Perkhidmatan.
- c) Pentadbiran – Matapelajaran ini akan menerangkan prosedur-prosedur pentadbiran yang berkaitan dengan beberapa jenis lembaga yang wujud dalam perkhidmatan seperti Lembaga Penyiasatan, Lembaga Pelupusan, lembaga Semak Stok dan lembaga Penaksiran. Ianya juga akan menerangkan perkara berkaitan Kira-kira Stor, Peraturan Kemalangan Jalanraya dan Kerosakan Brek.u
- d) Kaedah Mengajar – Matapelajaran ini akan menerangkan tentang teknik menyoal, penerangan berhubung ujian dan spesifikasi ujian dan disiplin bilik kuliah. Di akhir modul, akan diterangkan persiapan persiapan bagi mengendalikan sesuatu pengajaran dan seterusnya akan diadakan latihan mengajar secara praktikal.
- e) Kaunseling – Di dalam matapelajaran ini pelajar akan didedahkan dengan perkara-perkara berkaitan kaunseling iaitu prinsip bimbingan kaunseling, teori kaunseling, kemahiran asas dan teknik kaunseling. Pelajar juga akan didedahkan dengan tahap-tahap kaunseling serta kaunseling kelompok. Di akhir modul, pelajar juga akan didedahkan dengan kaedah pencegahan dadah melalui kaunseling.

# 6) KO-KURIKULUM BERKREDIT UNIVERSITI

## PENDAHULUAN

Universiti Pertahanan Nasional Malaysia mengambil langkah positif dengan memberikan kredit kepada aktiviti kokurikulum. 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.

Mulai sesi 2009/2010 sebanyak 12 kursus kokurikulum berkredit tambahan telah ditawarkan meliputi enam (6) komponen iaitu:

- i. Latihan Ketenteraan Umum
- ii. Pasukan Beruniform
- iii. Sukan
- iv. Kreatif
- v. Budaya
- vi. Kepemimpinan

## LATARBELAKANG

Semua pelajar-pelajar Universiti Pertahanan Nasional Malaysia diwajibkan mengambil 6+2 jam kredit bagi mata pelajaran kursus kokurikulum berkredit.

Bagi Pegawai Kadet, diwajibkan mengambil 6 jam kredit Latihan Ketenteraan Umum yang dikendalikan oleh Akademi Latihan Ketenteraan dan 2 jam kredit Kursus Tempur Tanpa Senjata (TTS).

Bagi pelajar awam pula, diwajibkan mengambil 6 jam kredit pasukan beruniform PALAPES dan pelajar boleh memilih mana-mana 1 mata pelajaran kokurikulum berkredit tambahan yang ditawarkan daripada komponen sukan, kreatif, budaya dan kepemimpinan yang akan diberikan 2 jam kredit.

Kursus Latihan Ketenteraan Umum, ALK dan PALAPES berjalan sepanjang semester manakala kursus kokurikulum berkredit tambahan dikendalikan pada setiap hari Jumaat sepanjang semester.

## DASAR KO-KURIKULUM

Pihak universiti telah menetapkan kursus kokurikulum berkredit tambahan sebagai sebahagian daripada komponen wajib bagi program pengajian di peringkat Sarjana Muda. Adalah menjadi harapan agar kursus kokurikulum berkredit tambahan 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 dalam aspek-aspek rohani intelektual, emosi, sosial dan fizikal sejajar dengan hasrat UPNM melahirkan '*Intellectual Leaders of Character*'

## OBJEKTIF KURSUS KO-KURIKULUM BERKREDIT TAMBAHAN

- a.) Menggalakkan pelajar berkomunikasi dengan berkesan
- b.) Menggalakkan pelajar berfikir secara kritis, kreatif, inovatif, analitis dan berkebolehan mengaplikasikan pemahaman serta pengetahuan.
- c.) Menggalakkan pelajar berdikari dalam pemerolehan kemahiran dan pengetahuan baru.
- d.) 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.
- e.) Menggalakkan pelajar untuk mengamalkan standard moral yang tinggi dalam amalan profesional dan interaksi sosial.
- f.) Menggalakkan pelajar mengamalkan ciri kepemimpinan dalam pelbagai aktiviti.

## PENDAFTARAN KURSUS

1. Kursus Kokurikulum Berkredit adalah salah satu daripada kursus wajib di Universiti.
2. Pelajar wajib mendaftar kursus-kursus kokurikulum berkredit untuk memenuhi struktur pengajian mengikut syarat-syarat pengijazahan.
3. Struktur kursus kokurikulum berkredit adalah seperti berikut :
  - i. Jumlah maksimum kredit diwajibkan kepada pelajar Ijazah Sarjana Muda ialah 8 jam kredit iaitu 6 jam kredit untuk kokurikulum berkredit (Pasukan Beruniform PALAPES dan Latihan Ketenteraan Umum, ALK) dan 2 jam kredit bagi kokurikulum berkredit tambahan.

Syarat-syarat	Nama Kursus	Jumlah Jam Kredit
6 jam kredit diwajibkan dan tambahan 2 jam kredit lagi seperti berikut :	i) Badan Beruniform (Wajib) a.) Latihan Ketenteraan Umum, ALK b.) PALAPES	6
	ii) Kokurikulum Berkredit Tambahan. Komponen : - Sukan * - Kreatif - Kebudayaan - Kepemimpinan	2
	* Pegawai Kadet diwajibkan mengambil komponen sukan iaitu Tempur Tanpa Senjata	
<b>JUMLAH JAM KREDIT</b>		<b>8</b>

4. Pelajar boleh mengambil lebih daripada 2 jam kredit dalam semester yang sama selagi tidak mengganggu jadual waktu kuliah bagi kursus yang lain.
5. Pelajar akan menyelesaikan kursus kokurikulum bercredit ini di antara semester 1 hingga semester 6
6. Pelajar yang mendaftar kursus kokurikulum bercredit Latihan Ketenteraan Umum, ALK atau PALAPES wajib meneruskan pengajian selama 6 semester dari semester 1 hingga semester 6.
7. Pelajar yang mengambil salah satu daripada kursus ini boleh juga mendaftar kursus kokurikulum bercredit tambahan yang lain.
8. Sekiranya pelajar yang mengambil kursus PALAPES dan ingin menggugurkan kursus tersebut atas sebab faktor kesihatan, pelajar perlu mengulangi jumlah jam kredit bagi mencukupi minimum 6 jam kredit sebagai syarat bergraduasi.
9. Oleh kerana kursus kokurikulum bercredit ini merupakan kursus bercredit, maka ianya tertakluk kepada peraturan akademik program Ijazah Sarjana Muda UPNM. Pelajar dinasihatkan supaya sentiasa merujuk kepada buku panduan akademik UPNM.

### PERLAKSANAAN KURSUS

1. Kursus amali kokurikulum bercredit tambahan akan dijalankan pada setiap hari Jumaat mulai jam 3.00 hingga 6.00 petang di sepanjang semester.
2. Kapasiti pelajar bagi satu kumpulan kursus amali kokurikulum bercredit adalah antara 15 (minimum) sehingga 30 (maksimum) orang pelajar. Ini adalah kerana untuk memastikan penyampaian dan pengajaran dapat dilaksanakan dengan berkesan di antara pelajar dan jurulatih/fasilitator serta objektif kursus kokurikulum bercredit tambahan dapat dicapai.
3. Sekiranya jumlah pelajar yang mendaftar subjek kokurikulum kurang daripada 15 orang, subjek tersebut tidak akan ditawarkan dan pelajar-pelajar yang telah mendaftar dinasihatkan untuk mengambil subjek kursus kokurikulum bercredit tambahan yang lain.

## **PENILAIAN PRESTASI PEMBELAJARAN**

1. Setiap kursus dinilai berdasarkan empat kriteria iaitu buku log, kehadiran dan penglibatan, amali dan kemahiran insaniah.
2. Penilaian buku log adalah bertujuan memupuk pelajar menghargai ilmu yang diperolehi secara informal, mendorong mereka mendapatkan maklumat tambahan melalui pelbagai sumber dan meningkatkan refleksi (komunikasi intrapersonal)
3. Kehadiran dan penglibatan pelajar semasa menjalankan teori dan amali adalah amat dititikberatkan. Pelajar-pelajar yang telah mendaftar subjek kursus kokurikulum ber kredit wajib menghadiri kelas yang telah ditetapkan.
4. Pelajar yang tidak hadir perlu mengemukakan surat/bukti kepada fasilitator.
5. Penilaian amali pula bertujuan untuk mengukur sejauhmana kefahaman pelajar-pelajar terhadap pembelajaran yang telah dipelajari mengikut Rancangan Pengajaran. Penilaian amali boleh dijalankan dalam bentuk penganjuran aktiviti dan penilaian secara individu atau berkumpulan.
6. Penilaian kemahiran insaniah adalah berdasarkan kepada pemerhatian terhadap sikap dan tingkah laku pelajar dalam menguasai Kemahiran Insaniah yang akan dinilai oleh jurulatih/fasilitator.

## **PENGGREDAN**

1. Nilai gred akan diberikan kepada pelajar-pelajar kursus kokurikulum ber kredit mengikut skema pemarkahan universiti yang telah ditetapkan.
2. Fasilitator/jurulatih bertanggungjawab memasukkan markah pelajar berdasarkan agihan penilaian kursus dengan mengisi Borang Penilaian Kursus Keseluruhan.
3. Pelajar yang gagal dalam kursus ini, hendaklah mengambil semula kursus dengan cara mengulangi kursus tersebut sehingga lulus. Bagi tujuan pengiraan, gred yang terbaik akan dikira bagi tujuan pengiraan PNGK. Walaubagaimanapun rekod kursus yang diulangi akan dicatat di dalam transkrip pelajar.

## **PEMANTAUAN**

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

**SENARAI KURSUS KO-KURIKULUM BERKREDIT TAMBAHAN**

BIL	SUBJEK	KOD SUBJEK
<b>KOMPONEN SUKAN</b>		
1.	Tenis	QKS 1002
2.	Hoki	QKS 1102
3.	Futsal	QKS 1202
4.	Silat Olahraga	QKS 1302
5.	Ragbi	QKS 1402
6.	Bola Sepak	QKS 1502
7.	Tempur Tanpa Senjata	QKS 1602
<b>KOMPONEN KREATIF</b>		
8.	Pengucapan Awam	QKK 1002
<b>KOMPONEN BUDAYA</b>		
9.	Muzik Gamelan	QKB 1002
10.	Nasyid	QKB 1102
11.	Iqra`	QKB 1202
<b>KOMPONEN KEPEMIMPINAN</b>		
12.	Asas Kesukarelawanan	QKL 1002



## SINOPSIS KURSUS KEMAHIRAN BERKREDIT TAMBAHAN

### a.) KOMPONEN KEPEMIMPINAN

<b>KESUKARELAWANAN</b>	
Sinopsis Kursus	Kursus ini menekankan aspek-aspek kemahiran asas kesukarelawan yang dapat digunakan oleh pelajar untuk membantu diri, persatuan , rakan pelajar, keluarga dan masyarakat. Kursus ini juga memberi peluang kepada pelajar mempelajari kemahiran asas kepimpinan , pentadbiran, pengurusan.

### b.) KOMPONEN SUKAN

<b>BOLA SEPAK</b>	
Sinopsis Kursus	Perkembangan permainan bolasepak, prinsip, undang-undang dan kemahiran permainan, pendedahan permainan dari aspek organisasi, kecergasan fizikal, kepegawaian dan latihan permainan.
<b>SILAT SENI</b>	
Sinopsis Kursus	Perkembangan permainan Silat Seni, prinsip, undang-undang dan kemahiran permainan, pendedahan permainan dari aspek organisasi, kecergasan fizikal dan kepegawaian.
<b>TENIS</b>	
Sinopsis Kursus	Perkembangan permainan tenis, prinsip, undang-undang dan kemahiran permainan, pendedahan permainan dari aspek organisasi, kecergasan fizikal, kepegawaian dan latihan permainan.
<b>HOKI</b>	
Sinopsis Kursus	Perkembangan permainan hoki, prinsip, undang-undang dan kemahiran permainan, pendedahan permainan dari aspek organisasi, kecergasan fizikal, kepegawaian dan latihan permainan.
<b>FUTSAL</b>	
Sinopsis Kursus	Perkembangan permainan futsal, prinsip, undang-undang dan kemahiran permainan, pendedahan permainan dari aspek organisasi, kecergasan fizikal, kepegawaian dan latihan permainan.
<b>RAGBI</b>	
Sinopsis Kursus	Perkembangan permainan Ragbi, prinsip, undang-undang dan kemahiran permainan, pendedahan permainan dari aspek organisasi, kecergasan fizikal dan kepegawaian, .

c.) **KOMPONEN BUDAYA**

<b>IQRA</b>	
Sinopsis Kursus	Kursus ini akan mendedahkan kepada pelajar cara mempelajari Al-Quran dengan cara yang mudah dan cepat dengan membaca modul Iqra' dengan lancar mengikut kaedah Iqra' dan mengaplikasikan tanda-tanda bacaan Rasm Usmani dalam cara bacaan Al-Quran.
<b>NASYID</b>	
Sinopsis Kursus	Kursus ini akan memberikan pendedahan kepada pelajar asas vokal dengan cara mempelajari kaedah <b>suara, teknik, penjiwaan dan persembahan</b> yang betul serta membaca notasi lagu-lagu nasyid secara berkumpulan.
<b>MUZIK GAMELAN</b>	
Sinopsis Kursus	Kursus ini akan mendedahkan kepada pelajar cara-cara memainkan dan menggunakan peralatan gamelan dengan betul serta mempelajari notasi lagu-lagu gamelan yang sering dimainkan dalam majlis-majlis rasmi.

d.) **KOMPONEN KREATIF**

<b>PENGUCAPAN AWAM</b>	
Sinopsis Kursus	Kursus ini akan mendedahkan kepada pelajar cara-cara untuk berkomunikasi dengan baik terutama dikhalayak ramai dan menangani kegugupan serta membangunkan kemahiran komunikasi pelajar-pelajar.

**Profesor**

1. Dr Megat Mohamad Hamdan bin Megat Ahmad  
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**Profesor Madya**

3. Ir Zainal Abidin bin Wan Chik  
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4. Lt Kol Ir Hj Mohd Ghani bin Mohd Madersah (B)  
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**Pensyarah Kanan**

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9. Lt Kol Muhamad bin Murrad  
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10. Lt Kol Khairul Hasni bin Kamarudin  
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**Pensyarah**

11. Dian Darina Indah binti Hj. Darius\*  
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12. Lt Kol Abdul Latif B. Taha (B)  
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18. Norwazan binti Abd Rahim

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***Tutor***

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27.Noor Hafizah binti Amer  
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28.Azam bin Che Idris\*  
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29.Mohd Rashdan bin Saad\*  
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30.Syafawati binti Hasbi  
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