UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ACADEMIC HANDBOOK 2023/2024

FOR ENGINEERING TECHNOLOGY
BACHELOR DEGREE
PROGRAMMES

FACULTY OF MECHANICAL TECHNOLOGY
AND ENGINEERING
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ACADEMIC HANDBOOK
SESSION 2023/2024
FOR ENGINNERING TECHNOLOGY BACHELOR DEGREE PROGRAMMES

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FACULTY OF MECHANICAL TECHNOLOGY AND ENGINEERING

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UTeM TOP MANAGEMENT

PROF. TS. DR. MASSILA BINTI KAMALRUDIN
Vice Chancellor

PROF. DR. ZULKIFILIE BIN IBRAHIM
Deputy Vice Chancellor,
Academic & International

PROF. IR. DR. GHAZALI BIN OMAR
Deputy Vice Chancellor,
Research & Innovation

ASSOC. PROF. DATUK DR. SABRI BIN MOHAMAD SHARIF
Deputy Vice Chancellor, Research & Innovation

ENCIK MASDZARIF BIN MAHAT
Chief Operating Officer

ENCIK KHAIRUL BIN TAIB
Bursar

ENCIK AZMAN BIN HJ AYUB
Chief Librarian

DATUK AZHAR BIN MOHAMED
Legal Advisor

PROF. DR. MOHD KHANAPI BIN ABD GHANI
Chief Information Office

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UTeM VISION, MISSION, MOTTO

Vision
To Be One of the World's Leading Innovative and Creative Technical Universities.

Mission
UTeM is committed to pioneer and contribute towards the prosperity of the nation and the world by:

1. Promoting knowledge through innovative teaching & learning, research and technical scholarship.
2. Developing professional leaders with impeccable moral values.
3. Generating sustainable development through smart partnership with the community and industry.

Motto
Excellence Through Competency

UTeM GENERAL EDUCATION GOALS

1. To conduct academic & professional programs based on relevant needs of the industries.
2. To produce graduates with relevant knowledge, technical competency, soft skills, social responsibility and accountability.
3. To cultivate scientific method, critical thinking, creative & innovation problem solving & autonomy in decision making amongst graduates.
4. To foster development and innovation activities in collaboration with industries for the development of national wealth.
5. To equip graduates with leadership & teamwork skills as well as develop communication & life-long learning skills.
6. To develop technopreneurship & managerial skills amongst graduates.
7. To instill an appreciation of the arts & cultural values and awareness of healthy life styles amongst graduates.

Dean's Foreword

بسم الله الرحمن الرحيم

This academic handbook aims to be a reference for undergraduate students to understand and get to know the faculty and the programmes offered at Faculty of Mechanical Technology and Engineering (FTKM). In addition, student will find all the necessary information regarding academic route, such as courses to be taken, pointers calculations, staff contact information and many more.

For instance, FTKM reacted rapidly and made challenging decisions on reorganizing teaching and learning as well as research and student activities year by year. The education has been back to normal but follow restricted operation following the certain standard of procedure. To do so, FTKM staffs enhanced their teaching skills and tools, to identify new ways of engagement with students and communities.

As a higher education institution, FTKM have a crucial role. FTKM believe our faculty is well equipped with educators from various mechanical engineering backgrounds field and different pedagogical techniques to help undergraduate student shapes in 21st-century. FTKM are continuously working on ways to tackle any issues prudently to ensure that no undergraduate student is left behind throughout their studies.

Lastly, we wish all our upcoming and current students all the best to embark on your educational journey here at FTKM and UTeM!

"FTKM - GEARED FOR EXCELLENCE"

Best wishes.
Professor Dr. Mohd Fadzli bin Abdollah
Dean

ENGINEERING TECHNOLOGY PROGRAMMES OFFERED

NO	PROGRAMME NAME	SHORT CODE
1	Bachelor of Mechanical Engineering Technology (Automotive Technology) with Honours	BMKA
2	Bachelor of Mechanical Engineering Technology (Refrigeration and Air-Conditioning Systems) with Honours	BMKH
3	Bachelor of Mechanical Engineering Technology (Maintenance Technology) with Honours	BMKM
4	Bachelor of Mechanical Engineering Technology with Honours	BMKV

PROGRAMME DURATION

BMKA, BMKH, BMKM, and BMKV durations are within minimum of 4 years and up to maximum of 6 years.

GRADING SYSTEM

A student's achievement for each course in a programme is based on the grades that are illustrated in Table 1.

Table 1: Marks, Grades and Points Awarded

MARKS	GRADE	POINTS	ACHIEVEMENTS
80 – 100	A	4.0	Distinction
75 – 79	A-	3.7	Distinction
70 – 74	B+	3.3	Merit
65 – 69	B	3.0	Merit
60 – 64	B-	2.7	Merit
55 – 59	C+	2.3	Pass
50 – 54	C	2.0	Pass
47 – 49	C-	1.7	Conditional Pass
44 – 46	D+	1.3	Conditional Pass
40 – 43	D	1.0	Conditional Pass
0 – 39	E	0.0	Fail

ACADEMIC CLASSIFICATION

A student's achievement is evaluated based on Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA). A student's academic status will be provided at the end of each semester based on CGPA as shown in Table 2.

Table 2: Academic Status Classification

STATUS	CGPA
Good (KB)	CGPA ≥ 2.00
Conditional (KS)	1.70 ≤ CGPA < 2.00
Fail (KG)	CGPA < 1.70

(Note: KB = Kedudukan Baik, KS = Kedudukan Bersyarat, KG = Kedudukan Gagal)

ACADEMIC ADVISORY SYSTEM

Students are free to take courses offered by the faculty at any semester based on their capability, as long as it complies with the rules and regulations set up by the faculty and university academic board. Students need to plan their own study carefully and the faculty shall appoint an academic advisor to guide them during their duration of study in the university.

Characteristics of the Semester System:

- Students are free to take any courses offered in each semester based on their ability; and conditions of course selection are determined by the faculty and university's academics regulations.
- Students should plan their study and learning appropriately or as advised by their academic advisor.

The Importance of Academic Advisor:

- Students need to be guided in term of courses taken under the semester system, where they are free to determine the number of courses to be taken based on their capability or in case the student obtained a Conditional Position (KS) in the previous semester. They need to plan carefully to take courses which are suitable for them to carry and fully aware on its implication to their whole study period in the university.
- Semester system is a flexible system for a student with high, moderate or less capability to complete their study based on their own capability whilst complying with the maximum study period set up by the university.
- The academic advisor is able to provide an advice not only in the academic matter, but also in the aspects of how the students can adapt themselves to the semester system, culture shock of studying in the university, time management and private matters that may affect the students' study performance.
- In the condition where the student is not with the same batch of other students during the study period due to difference in the courses taken, difficulty may be expected for him/her to discuss on the matter of study with the others. Thereby, the role of academic advisor is important.

Roles and Responsibilities of student and academic advisor in the Academic Advisory System are as follows:

ACADEMIC ADVISOR	STUDENT
• Conduct a meeting with students at least twice per semester.	• Always be open-minded when meeting with the academic advisor.
• Make sure student understand the academic system in UTeM.	• Attend meetings conducted by the academic advisor.
• Guide and make sure student's courses registration is based on his/her current academic result.	• Regard the academic advisor as a mentor and seek advice on the academic matters from them.
• Supervise the student study progress and provide guidance in making a good study planning.	• Learn to have a good understanding of the academic system and his/her Curriculum Structure.
• Inspire students so that they will always be motivated in their study.	• Get the certification of registration form, copy of certificates and reference letter from the academic advisor (if any).
• Ensure the student's record and file is always updated – make sure no course is missed to fulfill the requirement for the award of a Bachelor's Degree.	• Keep records on all courses that have already been taken during the period of study to prevent missed course and fulfill the requirement for degree award.
• Verify and approve the pre-registration of the new semester courses in the SMP portal.	• Perform pre-registration of the new semester courses in the SMP portal.

GPA & CGPA CALCULATION

A student's overall achievement is based on Grade Point Average (GPA) obtained for a particular semester and Cumulative Grade Point Average (CGPA) for the semesters that have been completed.

Grade Point Average (GPA)

GPA is the grade point average obtained in a particular semester. It is based on the following calculations:

Total Points, $JMN = k_1m_1 + k_2m_2 + ...k_nm_n$

Total Calculated Credits, $JKK = k_1 + k_2 + ...k_n$

$GPA = JMN / JKK$
$= [k_1m_1 + k_2m_2 + ...k_nm_n] / [k_1 + k_2 + ... k_n]$

Where : k_n = Credit for n course
m_n = Points from the n course

Cumulative Grade Point Average (CGPA)

CGPA is the cumulative grade point average obtained for the semesters that have been completed. It is based on the following calculations:

$CGPA = [JMN_1 + JMN_2 + ...JMN_n] / [JKK_1 + JKK_2 + ...JKK_n]$

Where: JMN_n = Total points obtained in n semester
JKK_n = Total credits in n semester

GRADUATION REQUIREMENT

A Bachelor degree shall be awarded to the student if he/she fulfills all the following conditions:

1. Must get Good Status (KB) in the final semester and ended up with Awarded Status (KBA).
2. Pass all the courses required as listed in the programme curriculum structure.
3. Apply for the award of the degree, approved by faculty and certified by university senate.
4. Meet all the other requirements set by the university.
5. Students do not have any debt with the university.

ACADEMIC HANDBOOK SESSION 2023/2024

FOR BACHELOR DEGREE PROGRAMMES

CURRICULUM STRUCTURE ENGINEERING TECHNOLOGY PROGRAMMES

FTKM

FACULTY OF MECHANICAL TECHNOLOGY AND ENGINEERING
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

1-

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (AUTOMOTIVE TECHNOLOGY) PROGRAMME

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

Programme Educational Objectives (PEO) is specific goals describing expected achievements of graduates in their career and professional life after graduation. To produce, after 3 to 5 years of graduation:

PEO1	Graduates who are able to practice the knowledge in Mechanical Engineering Technology (Automotive Technology).
PEO2	Graduates who are able to engage with continuous development and adapt to evolving technologies.
PEO3	Graduates who are able to adapt professional ethics and leadership to meet the needs of the society.

PROGRAMME OUTCOMES (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviours that students acquire through their programme of studies.

PO1	Ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialisation principles to defined and applied engineering procedures, processes, systems or methodologies in the field of Mechanical Engineering Technology (Automotive Technology).
PO2	Ability to solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to Mechanical Engineering Technology (Automotive Technology).
PO3	Ability to design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.
PO4	Ability to plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.
PO5	Ability to select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.
PO6	Ability to demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities relevant to engineering technology practice.
PO7	Ability to demonstrate an understanding of the impact of engineering technology practices, taking into account the need for sustainable development.
PO8	Ability to demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO9	Ability to function effectively as individuals, and as members or leaders in diverse technical teams.
PO10	Ability to communicate effectively on broadly-defined engineering activities with the engineering community and society at large.
PO11	Ability to demonstrate an awareness of project management, business practices and entrepreneurship.
PO12	Ability to recognise the need for professional development and to engage in independent and lifelong learning.

Bachelor of Mechanical Engineering Technology (Automotive Technology) with Honours (BMKA)

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BELG 1013	*Matematik Teknikal* Technical Mathematics	P	3	
	BMKT 1112	*Fizik* Physics	P	2	
	BMKT 1413	*Grafik Kejuruteraan* Engineering Graphics	K	3	
	BMKT 1613	*Bahan Kejuruteraan* Engineering Materials	K	3	
	BMKT 1713	*Prinsip Elektrik dan Elektronik* Principles of Electric and Electronics	K	3	
	BLHW 1762	*Falsafah dan Isu Semasa* Philosophy and Current Issues	W	2	
	BLLW 1142	*Bahasa Inggeris untuk Tujuan Akademik* English for Academic Purposes	W	2	
	BKKX XXX1	*Kokurikulum I* Cocurriculum I	W	1	
TOTAL CREDITS THIS SEMESTER				19	
SEMESTER 2	BMIG 1023	*Kalkulus untuk Teknologi* Calculus For Technology	P	3	
	**BMKT 2423	*Permodelan dan Analisis Berkomputer* Modelling and Computer Analysis	K	3	BMKT 1413
	BMKT 1313	*Statik* Statics	K	3	
	BMKT 1623	*Amalan Pembuatan* Manufacuring Practices	K	3	
	BMKT 2633	*Pengukuran dan Instrumentasi* Measurement and Instrumentation	K	3	
	BLHW 2772	*Penghayatan Etika dan Peradaban* Appreciation of Ethics and Civilizations	W	2	
	BKKX XXX1	*Kokurikulum II* Cocurriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				18	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BERG 2043	*Kaedah Statistik* Statistical Methods	P	3	
	BMKT 1723	*Pengaturcaraan Komputer* Computer Programming	K	3	
	BMKT 2513	*Termodinamik* Thermodynamics	K	3	
	BMKA 2213	*Teknologi Pembuatan* Manufacturing Technology	K	3	
	**BMKT 2333	*Dinamik dan Mekanik Mesin* Dynamics and Mechanics of Machine	K	3	BMKT 1313
	**BLLW 2152	*Penulisan Akademik* Academic Writing	W	2	BLLW 1142
TOTAL CREDITS THIS SEMESTER				17	
SEMESTER 4	BMKG 2033	*Kalkulus Gunaan untuk Teknologi* Applied Calculus for Technology	P	3	
	BMKT 2433	*Reka Bentuk Kejuruteraan* Engineering Design	K	3	
	**BMKT 2323	*Mekanik Pepejal* Solid Mechanics	K	3	BMKT 1313
	BMKT 2523	*Mekanik Bendalir* Fluid Mechanics	K	3	
	BMKT 2733	*Teknologi Mikropemproses* Microprocessor Technology	K	3	
	BLHC 4032	*Pemikiran Kritis dan Kreatif* Critical and Creative Thinking	W	2	
	BLLW XXX2	*Bahasa Ketiga* Third Language	W	2	
TOTAL CREDITS THIS SEMESTER				19	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BMKT 3743	*Kawalan dan Instrumentasi* Control and Instrumentation	K	3	
	BMKA 3313	*Sistem Brek Kenderaan* Vehicle Brake System	K	3	
	BMKA 3113	*Enjin Pembakaran Dalaman* Internal Combustion Engine	K	3	
	BMKA 3123	*Sistem Pengurusan Kuasa Kenderaan* Vehicle Powertrain Management System	K	3	
	BMKA 3223	*Dinamik Kenderaan* Vehicle Dynamics	K	3	
	BMKA 3323	*HVAC untuk Automotif* HVAC for Automotive	K	3	
	#BMXX XXX0	*Kursus Persediaan Pensijilan Profesional* Professional Certificate Preparation Course	P	0	
TOTAL CREDITS THIS SEMESTER				18	
SEMESTER 6	BMIU 4053	*Etika Kejuruteraan dan KKKP* Engineering Ethics and OSHE	P	3	
	**BMKT 3214	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	**BLLW 3162	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	BLLW 2152
	*BMKX XXX3	*Elektif I* Elective I	E	3	
	*BMKX XXX3	*Elektif II* Elective II	E	3	
	*BMKX XXX3	*Elektif III* Elective III	E	3	
	***BLHX XXX2	*Elektif Umum* General Elective	W	2	
TOTAL CREDITS THIS SEMESTER				20	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BMKA 4233	*Sistem Penggantungan Kenderaan* Vehicle Suspension System	K	3	
	BMKA 4143	*Sistem Transmisi Kenderaan* Vehicle Transmission System	K	3	
	BMKA 4133	*Prestasi Enjin* Engine Performance	K	3	
	BMKA 4243	*Sistem Pengeluaran Kejat* Lean Production System	K	3	
	**BMKT 4224	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	BMKT 3214
	BTMW 4012	*Keusahawanan Teknologi* Technology Entrepreneurship	W	2	
TOTAL CREDITS THIS SEMESTER				18	
SEMESTER 8	BMKT 4236	*Latihan Industri* Industrial Training	K	6	
	BMKT 4246	*Laporan Latihan Industri* Industrial Training Report	K	6	
TOTAL CREDITS THIS SEMESTER				12	
TOTAL CREDITS				141	

** Pre-requisite COURSE W
University Compulsory P
Faculty Core
K Programme Core E
Elective

* For Elective I, II and III students may choose any THREE (3) COURSES from the list below:

NO.	CODE	COURSE NAME
1	BMKA 4343	*Sistem Elektrik dan Elektronik Automotif* Automotive Electric and Electronic System
2	BMKA 4253	*Reka Bentuk dan Simulasi Kenderaan* Vehicle Design and Simulation
3	BMKA 4333	*Sistem Keselamatan dan Keselesaan Automatif* Automotive Safety and Comfort System
4	BMKM 4353	*Analisis Minyak dan Serpihan* Oil and Wear Debris Analysis
5	BMKA 4353	*Teknologi Pneumatik dan Hidraulik* Pneumatic and Hydraulic Technology

*** For General elective, students may choose any ONE (1) COURSE from the list below:

CODE	COURSE NAME
BLHW 1722	*Falsafah Sains dan Teknologi* Philosophy of Science and Technology
BLHH 1032	*Psikologi Industri dan Organisasi* Industrial and Organizational Psychology
BLHC 4012	*Komunikasi Keorganisasian* Organizational Communication
BLHC 4022	*Kemahiran Perundingan* Negotiation Skills

\# For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

CODE	CERTIFICATE NAME
BMKA 3100	Certified CATIA V6 – Part Design Associate
BMKA 3110	Certified Hypermesh

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (REFRIGERATION AND AIR-CONDITIONING SYSTEMS) PROGRAMME

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

Programme Educational Objectives (PEO) is specific goals describing expected achievements of graduates in their career and professional life after graduation. To produce, after 3 to 5 years of graduation:

PEO1	Graduates who are able to practice the knowledge in Mechanical Engineering Technology (Refrigeration and Air-Conditioning Systems).
PEO2	Graduates who are able to engage with continuous development and adapt to evolving technologies.
PEO3	Graduates who are able to adapt professional ethics and leadership to meet the needs of the society.

PROGRAMME OUTCOMES (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire through their programme of studies.

PO1	Ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialisation principles to defined and applied engineering procedures, processes, systems or methodologies in the field of Mechanical Engineering Technology (Refrigeration and Air-Conditioning Systems).
PO2	Ability to solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to Mechanical Engineering Technology (Refrigeration and Air-Conditioning Systems).
PO3	Ability to design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.
PO4	Ability to plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.
PO5	Ability to select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.
PO6	Ability to demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities relevant to engineering technology practice.
PO7	Ability to demonstrate an understanding of the impact of engineering technology practices, taking into account the need for sustainable development.
PO8	Ability to demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO9	Ability to function effectively as individuals, and as members or leaders in diverse technical teams.
PO10	Ability to communicate effectively on broadly-defined engineering activities with the engineering community and society at large.
PO11	Ability to demonstrate an awareness of project management, business practices and entrepreneurship.
PO12	Ability to recognize the need for professional development and to engage in independent and lifelong learning.

Bachelor of Mechanical Engineering Technology (Refrigeration and Air-Conditioning Systems) with Honours (BMKH)

	CODE	COURSE	CATEGORY	CREDIT	PRE- REQUISITE
SEMESTER 1	BELG 1013	*Matematik Teknikal* Technical Mathematics	P	3	
	BMKT 1112	*Fizik* Physics	P	2	
	BMKT 1413	*Grafik Kejuruteraan* Engineering Graphics	K	3	
	BMKT 1613	*Bahan Kejuruteraan* Engineering Materials	K	3	
	BMKT 1313	*Statik* Statics	K	3	
	BMKT 2633	*Pengukuran dan Instrumentasi* Measurement and Instrumentation	K	3	
	BLHW 1762	*Falsafah dan Isu Semasa* Philosophy and Current Issues	W	2	
	BKKX XXX1	*Kokurikulum I* Cocurriculum I	W	1	
TOTAL CREDITS THIS SEMESTER				20	
SEMESTER 2	BMIG 1023	*Kalkulus untuk Teknologi* Calculus for Technology	P	3	
	BMKH 1413	*Asas Elektrik dan Elektronik HVAC* Fundamental of HVAC Electric and Electronic	K	3	
	BMKT 1623	*Amalan Pembuatan* Manufacturing Practices	K	3	
	BMKT 2433	*Reka Bentuk Kejuruteraan* Engineering Design	K	3	
	BMKT 2513	*Termodinamik* Thermodynamics	K	3	
	BLLW 1142	*Bahasa Inggeris untuk Tujuan Akademik* English for Academic Purposes	W	2	
	BKKX XXX1	*Kokurikulum II* Cocurriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				18	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BERG 2043	*Kaedah Statistik* Statistical Methods	P	3	
	BMKT 1723	*Pengaturcaraan Komputer* Computer Programming	K	3	
	** BMKT 2323	*Mekanik Pepejal* Solid Mechanics	K	3	BMKT 1313
	** BMKT 2333	*Dinamik dan Mekanik Mesin* Dynamic and Mechanics of Machine	K	3	BMKT 1313
	** BMKT 2423	*Permodelan dan Analisis Berkomputer* Modelling and Computer Analysis	K	3	BMKT 1413
	BLHW 2772	*Penghayatan Etika dan Peradaban* Appreciation of Ethics and Civilization	W	2	
	BTMW 4012	*Keusahawanan Teknologi* Technology Enterpreneurship	W	2	
TOTAL CREDITS THIS SEMESTER				19	
SEMESTER 4	BMKG 2033	*Kalkulus Gunaan untuk Teknologi* Applied Calculus for Technology	P	3	
	BMKT 2523	*Mekanik Bendalir* Fluid Mechanics	K	3	
	BMKH 2123	*Projek Rekabentuk HVAC* HVAC Design Project	K	3	
	BMKH 2113	*Asas HVAC dan Penyejukan* Fundamental of HVAC and Refrigeration	K	3	
	BMKT 3533	*Pemindahan Haba* Heat Transfer	K	3	
	**BLLW 2152	*Penulisan Akademik* Academic Writing	W	2	BLLW 1142
	BLLW XXX2	*Bahasa Ketiga* Third Language	W	2	
TOTAL CREDITS THIS SEMESTER				19	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BMKT 3743	*Kawalan dan Instrumentasi* Control and Instrumentation	K	3	
	BMKH 3153	*Beban Pemanasan dan Penyejukan* Heating and Cooling Load	K	3	
	BMKH 3133	*Rekabentuk Sistem Penyejukan* Refrigeration System Design	K	3	
	BMKH 3433	*Akustik dan Getaran Gunaan HVAC* HVAC Applied Acoustics & Vibration	K	3	
	**BLLW 3162	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	BLLW 2152
	***BLHX XXX2	*Elektif Umum* General Elective	W	2	
TOTAL CREDITS THIS SEMESTER				16	
SEMESTER 6	BMKH 3163	*Sistem Pengagihan Udara* Air Distribution System	K	3	
	BMKH 3224	*Penyaman Udara dan Penyejukan Kenderaan* Transportation Air Conditioning and Refrigeration	K	4	
	BMKH 3213	*Kualiti Udara Dalaman* Indoor Air Quality	K	3	
	**BMKT 3214	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	**BMKH 3423	*Sistem Elektrik dan Kawalan HVAC* HVAC Electrical and Control System	K	3	BMKH 1413
	BLHC 4032	*Pemikiran Kritis dan Kreatif* Critical and Creative Thinking	W	2	
	#BMXX XXX0	*Kursus Persediaan Pensijilan Profesional* Professional Certificate Preparation Course	P	0	
TOTAL CREDITS THIS SEMESTER				19	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BMIU 4053	*Etika Kejuruteraan dan KKKP* Engineering Ethics and OSHE	P	3	
	BMKH 4143	*Klasifikasi Sistem Penyaman Udara* Classification of Air Conditioning System	K	3	
	**BMKT 4224	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	BMKT 3214
	*BMKH XXX3	*Elektif I* Elective I	E	3	
	*BMKH XXX3	*Elektif II* Elective II	E	3	
	*BMKH XXX3	*Elektif III* Elective III	E	3	
TOTAL CREDITS THIS SEMESTER				19	
SEMESTER 8	BMKT 4236	*Latihan Industri* Industrial Training	K	6	
	BMKT 4246	*Laporan Latihan Industri* Industrial Training Report	K	6	
TOTAL CREDITS THIS SEMESTER				12	
TOTAL CREDITS				142	

** Pre-requisite COURSE
W University Compulsory
P Faculty Core
K Programme Core
E Elective

* For Elective I, II and III students may choose any THREE (3) COURSES from the list below:

NO.	CODE	COURSE
1.	BMKH 4233	*Penyelenggaraan Sistem HVAC* Maintenance of HVAC System
2.	BMKH 4173	*Permodelan dan Analisis HVAC* HVAC Modelling and Analysis
3.	BMKM 4243	*Penentukuran Instrumen* Instrument Calibration
4.	BMKH 4243	*Teknologi Hijau HVAC* HVAC Green Technology
5.	BMKH 4313	*Pengurusan Projek* Project Management
6.	BMKH 4323	*Pembuatan Kejat* Lean Manufacturing
7.	BMKH 4333	*Jig dan Lekapan* Jig and Fixtures
8.	BMKH 4343	*Pengamalan Industri Terkehadapan* Industrial Forward Practice
9.	BMKH 4353	*Kewangan, Kos dan Ekonomi Kejuruteraan* Engineering Financial, Costing and Economics
10.	BMKH 4363	*Pengurusan Pembuatan* Manufacturing Management

*** For General elective, students may choose any ONE (1) COURSE from the list below:

CODE	COURSE NAME
BLHW 1722	*Falsafah Sains dan Teknologi* Philosophy of Science and Technology
BLHH 1032	*Psikologi Industri dan Organisasi* Industrial and Organizational Psychology
BLHC 4012	*Komunikasi Keorganisasian* Organizational Communication
BLHC 4022	*Kemahiran Perundingan* Negotiation Skills

For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

CODE	CERTIFICATE NAME
BMKA 3100	Catia V6 – Part Design Associate Certification
BMKA 3110	Hypermesh Certification
BMKD 3100	Solidworks Associate Certification
BMKG 2520	Autocad Professional Certification Preparation

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (MAINTENANCE TECHNOLOGY) PROGRAMME

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

Programme Educational Objectives (PEO) is specific goals describing expected achievements of graduates in their career and professional life after graduation. To produce, after 3 to 5 years of graduation:

PEO1	Graduates who are able to practice the knowledge in Mechanical Engineering Technology (Maintenance Technology).
PEO2	Graduates who are able to engage with continuous development and adapt to evolving technologies.
PEO3	Graduates who are able to adapt professional ethics and leadership to meet the needs of the society.

PROGRAMME OUTCOMES (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire through their programme of studies.

PO1	Ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialisation principles to defined and applied engineering procedures, processes, systems or methodologies in the field of Mechanical Engineering Technology (Maintenance Technology).
PO2	Ability to solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to Mechanical Engineering Technology (Maintenance Technology).
PO3	Ability to design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.
PO4	Ability to plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.
PO5	Ability to select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.
PO6	Ability to demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities relevant to engineering technology practice.
PO7	Ability to demonstrate an understanding of the impact of engineering technology practices, taking into account the need for sustainable development.
PO8	Ability to demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO9	Ability to function effectively as individuals, and as members or leaders in diverse technical teams.
PO10	Ability to communicate effectively on broadly-defined engineering activities with the engineering community and society at large.
PO11	Ability to demonstrate an awareness of project management, business practices and entrepreneurship.
PO12	Ability to recognise the need for professional development and to engage in independent and lifelong learning.

Bachelor of Mechanical Engineering Technology (Maintenance Technology) with Honours (BMKM)

	CODE	COURSE	CATEGORY	CREDIT	PRE- REQUISITE
SEMESTER 1	BELG 1013	*Matematik Teknikal* Technical Mathematics	P	3	
	BMKT 1112	*Fizik* Physics	P	2	
	BMKT 1413	*Grafik Kejuruteraan* Engineering Graphics	K	3	
	BMKT 1613	*Bahan Kejuruteraan* Engineering Materials	K	3	
	BMKT 2643	*Proses Pembuatan* Manufacturing Process	K	3	
	BMKT 2633	*Pengukuran dan Instrumentasi* Measurement and Instrumentation	K	3	
	BLHW 1762	*Falsafah dan Isu Semasa* Philosophy and Current Issues	W	2	
	BKKX XXX1	*Kokurikulum I* Cocurriculum I	W	1	
TOTAL CREDITS THIS SEMESTER				20	
SEMESTER 2	BMIG 1023	*Kalkulus untuk Teknologi* Calculus for Technology	P	3	
	BMKT 1313	*Statik* Statics	K	3	
	BMKT 1713	*Prinsip Elektrik dan Elektronik* Principles of Electric and Electronic	K	3	
	BMKT 2513	*Termodinamik* Thermodynamics	K	3	
	** BMKT 2423	*Permodelan dan Analisis Berkomputer* Modelling and Computer Analysis	K	3	BMKT 1413
	BLLW 1142	*Bahasa Inggeris untuk Tujuan Akademik* English for Academic Purposes	W	2	
	BKKX XXX1	*Kokurikulum II* Cocurriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				18	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BERG 2043	*Kaedah Statistik* Statistical Methods	P	3	
	BMKT 2433	*Reka Bentuk Kejuruteraan* Engineering Design	K	3	
	BMKT 2523	*Mekanik Bendalir* Fluid Mechanics	K	3	
	** BMKT 2333	*Dinamik dan Mekanik Mesin* Dynamics and Mechanics of Machine	K	3	BMKT 1313
	BMKM 2223	*Teknologi Perkakasan Mesin* Machine Tool Technology	K	3	
	BMKT 3543	*Teknologi Pneumatik dan Hidraulik* Pneumatic and Hydraulic Technology	K	3	
	BLLW XXX2	*Bahasa Ketiga* Third Language	W	2	
TOTAL CREDITS THIS SEMESTER				20	
SEMESTER 4	BMKG 2033	*Kalkulus Gunaan untuk Teknologi* Applied Calculus for Technology	P	3	
	BMKT 3743	*Kawalan dan Instrumentasi* Control and Instrumentation	K	3	
	** BMKT 2323	*Mekanik Pepejal* Solid Mechanics	K	3	BMKT 1313
	BMKM 2313	*Asas Tribologi* Basic Tribology	K	3	
	BMKM 2113	*Pengenalan kepada Penyelenggaraan* Introduction to Maintenance	K	2	
	**BLLW 2152	*Penulisan Akademik* Academic Writing	W	2	BLLW 1142
	BLHW 2772	*Penghayatan Etika dan Peradaban* Appreciation of Ethics and Civilizations	W	2	
TOTAL CREDITS THIS SEMESTER				18	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BMKM 2213	*Motor Industri* Industrial Motor	K	3	
	BMKM 3123	*Teknologi Penyelenggaraan dan Pengurusan Aset* Maintenance Technology and Asset Management	K	3	
	BMKM 3323	*Teknologi Penghantaran* Transmission Technology	K	3	
	BMKM 3333	*Diagnostik dan Pengenalpastian Masalah Penyelenggaraan* Maintenance Diagnostic and Troubleshooting	K	3	
	BMKM 3343	*Penyelenggaraan Mesin Mekanikal* Mechanical Machine Maintenance	K	3	
	**BLLW 3162	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	BLLW 2152
	***BIPW XXX2	*Elektif Umum* General Elective	W	2	
	#BMXX XXX0	*Kursus Persediaan Pensijilan Profesional* Professional Certificate Preparation Course	P	0	
TOTAL CREDITS THIS SEMESTER				19	
SEMESTER 6	BMKT 3214	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	BMKM 3133	*Analisis dan Pemantauan Getaran* Vibration Analysis and Monitoring	K	3	
	BLHC 4032	*Pemikiran Kritis dan Kreatif* Critical and Creative Thinking	W	2	
	*BMKM XXX3	*Elektif I* Elective I	E	3	
	*BMKM XXX3	*Elektif II* Elective II	E	3	
	*BMK XXX3	*Elektif III* Elective III	E	3	
TOTAL CREDITS THIS SEMESTER				18	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BMIU 4053	*Etika Kejuruteraan dan KKPP* Engineering Ethics and OSHE	P	3	
	BMKM 3154	*Pemeriksaan dan Penyelenggaraan Bangunan* Building Inspection and Maintenance	K	4	
	BMKM 4143	*Kesedaran Penyelenggaraan dalam Reka Bentuk* Maintenance Awareness in Design	K	2	
	BMKM 4353	*Analisis Minyak dan Serpihan* Oil and Wear Debris Analysis	K	3	
	** BMKT 4224	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	BMKT 3214
	BTMW 4012	*Keusahawanan Teknologi* Technology Entrepreneurship	W	2	
TOTAL CREDITS THIS SEMESTER				18	
SEMESTER 8	BMKT 4236	*Latihan Industri* Industrial Training	K	6	
	BMKT 4246	*Laporan Latihan Industri* Industrial Training Report	K	6	
TOTAL CREDITS THIS SEMESTER				12	
TOTAL CREDITS				143	

** Pre-requisite COURSE
W University Compulsory
P Faculty Core
K Programme Core
E Elective

* For Elective I, II and III students may choose any THREE (3) COURSES from the list below:

NO.	CODE	COURSE
1	BMKH 4233	*Penyelenggaraan Sistem HVAC* Maintenance of HVAC System
2	BMKM 4173	*Penyelenggaraan Berasaskan Keadaan* Condition Based Maintenance
3	BMKM 4243	*Penentukuran Instrumen* Instrument Calibration
4	BMKM 3233	*Teknologi Kawalan Industri* Industrial Control Technology
5	BMKM 4163	*Keboleharapan, Kebolehsenggaraan dan Risiko* Reliability, Maintainability and Risk

*** For General elective, students may choose any ONE (1) COURSE from the list below:

CODE	COURSE NAME
BLHW 1722	*Falsafah Sains dan Teknologi* Philosophy of Science and Technology
BLHH 1032	*Psikologi Industri dan Organisasi* Industrial Psychology and Organization
BLHC 4012	*Komunikasi Keorganisasian* Organizational Communication
BLHC 4022	*Kemahiran Perundingan* Negotiation Skills

\# For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

CODE	CERTIFICATE NAME
BMKG 2520	AutoCAD Professional Certification
BMKD 3100	Certified Solidworks Associate

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY PROGRAMME

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

Programme Educational Objectives (PEO) is specific goals describing expected achievements of graduates in their career and professional life after graduation. To produce, after 3 to 5 years of graduation:

PEO1	Graduates who are able to practice the knowledge in Mechanical Engineering Technology.
PEO2	Graduates who are able to engage with continuous development and adapt to evolving technologies.
PEO3	Graduates who are able to adapt professional ethics and leadership to meet the needs of the society.

PROGRAMME OUTCOMES (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire through their programme of studies.

PO1	Ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialisation principles to defined and applied engineering procedures, processes, systems or methodologies in the field of Mechanical Engineering Technology.
PO2	Ability to solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to Mechanical Engineering Technology.
PO3	Ability to design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.
PO4	Ability to plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.
PO5	Ability to select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.
PO6	Ability to demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities relevant to engineering technology practice.
PO7	Ability to demonstrate an understanding of the impact of engineering technology practices, taking into account the need for sustainable development.
PO8	Ability to demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PO9	Ability to function effectively as individuals, and as members or leaders in diverse technical teams.
PO10	Ability to communicate effectively on broadly-defined engineering activities with the engineering community and society at large.
PO11	Ability to demonstrate an awareness of project management, business practices and entrepreneurship.
PO12	Ability to recognise the need for professional development and to engage in independent and lifelong learning.

Bachelor of Mechanical Engineering Technology with Honours (BMKV)

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BELG 1013	*Matematik Teknikal* Technical Mathematics	P	3	
	BMKT 1123	*Fizik Teknikal* Technical Physics	P	3	
	BMKT 1413	*Grafik Kejuruteraan* Engineering Graphics	K	3	
	BMKT 1313	*Statik* Statics	K	3	
	BMKT 1713	*Prinsip Elektrik dan Elektronik* Principles of Electric and Electronic	K	3	
	BMKT 1623	*Amalan Pembuatan* Manufacturing Practices	K	3	
	BKKX XXX1	*Kokurikulum I* Cocurriculum I	W	1	
TOTAL CREDITS THIS SEMESTER				19	
SEMESTER 2	BMIG 1023	*Kalkulus untuk Teknologi* Calculus for Technology	P	3	
	BMKT 1133	*Kimia Teknikal* Technical Chemistry	P	3	
	BMKT 1613	*Bahan Kejuruteraan* Engineering Materials	K	3	
	BMKT 2433	*Reka Bentuk Kejuruteraan* Engineering Design	K	3	
	BMKT 2633	*Pengukuran dan Instrumentasi* Measurement and Instrumentation	K	3	
	BLHW 2772	*Penghayatan Etika Dan Peradaban* Appreciation of Ethics and Civilizations	W	2	
	BLLW 1142	*Bahasa Inggeris untuk Tujuan Akademik* English for Academic Purposes	W	2	
TOTAL CREDITS THIS SEMESTER				19	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BMKG 2033	*Kalkulus Gunaan untuk Teknologi* Applied Calculus for Technology	P	3	
	BMKT 2643	*Proses Pembuatan* Manufacturing Process	K	3	
	BMKT 2513	*Termodinamik* Thermodynamics	K	3	
	BMKT 2523	*Mekanik Bendalir* Fluid Mechanics	K	3	
	BMKT 2733	*Teknologi Mikropemproses* Microprocessor Technology	K	3	
	**BLLW 2152	*Penulisan Akademik* Academic Writing	W	2	BLLW 1142
	BKKX XXX1	*Kokurikulum II* Cocurriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				18	
SEMESTER 4	BERG 2043	*Kaedah Statistik* Statistical Methods	P	3	
	** BMKT 2323	*Mekanik Pepejal* Solid Mechanics	K	3	BMKT 1313
	** BMKT 2333	*Dinamik dan Mekanik Mesin* Dynamics and Mechanics of Machine	K	3	BMKT 1313
	BMKT 3543	*Teknologi Pneumatik dan Hidraulik* Pneumatic & Hydraulic Technology	K	3	
	** BMKT 2423	*Permodelan dan Analisis Berkomputer* Modelling and Computer Analysis	K	3	BMKT 1413
	BMKT 3533	*Pemindahan Haba* Heat Transfer	K	3	
	BLHW 1762	*Falsafah dan Isu Semasa* Philosophy and Current Issues	W	2	
TOTAL CREDITS THIS SEMESTER				20	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BMKH 2113	*Asas HVAC dan Penyejukan* Fundamental of HVAC and Refrigeration	K	3	
	BMKT 3653	*Pengurusan Projek* Project Management	K	3	
	BMKT 3343	*Getaran Mekanikal* Mechanical Vibration	K	3	
	BMKT 3743	*Kawalan dan Instrumentasi* Control and Instrumentation	K	3	
	BMKT 3443	*Projek Rekabentuk Bersepadu* Integrated Design Project	K	3	
	**BLLW 3162	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	BLLW 2152
	***BLHX XXX2	*Elektif Umum* General Elective	W	2	
	#BMXX XXX0	*Kursus Persediaan Pensijilan Profesional* Professional Certificate Preparation Course	P	0	
TOTAL CREDITS THIS SEMESTER				19	
SEMESTER 6	BMKT 3453	*Simulasi Berkomputer* Computer Simulation	K	3	
	BMKV 3313	*Kelestarian dan Alam Sekitar* Environment and Sustainability	K	3	
	BMKT 3214	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	BTMW 4012	*Keusahawanan Teknologi* Technology Enterpreneurship	W	2	
	*BMKV 4XX3	*Elektif I* Elective I	E	3	
	*BMKV 4XX3	*Elektif II* Elective II	E	3	
TOTAL CREDITS THIS SEMESTER				18	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BMIU 4053	*Etika Kejuruteraan dan KKKP* Engineering Ethics and OSHE	P	3	
	** BMKT 4224	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	BMKT 3214
	BLHC 4032	*Pemikiran Kritis dan Kreatif* Critical and Creative Thinking	W	2	
	BLLW 1XX2	*Bahasa Ketiga* Third Language	W	2	
	BMKV 4XX3	*Elektif III* Elective III	E	3	
	BMKV 4XX3	*Elektif IV* Elective IV	E	3	
TOTAL CREDITS THIS SEMESTER				17	
SEMESTER 8	BMKT 4236	*Latihan Industri* Industrial Training	K	6	
	BMKT 4246	*Laporan Latihan Industri* Industrial Training Report	K	6	
TOTAL CREDITS THIS SEMESTER				12	
TOTAL CREDITS				142	

** Pre-requisite COURSE
W University Compulsory
P Faculty Core
K Programme Core
E Elective

*For Elective I, II, III & IV students may choose any FOUR (4) COURSES from the list below:

NO.	CODE	COURSE
1.	BMKV 4113	*Kelestarian dan Bangunan Hijau* Green Building and Sustainability
2.	BMKV 4123	*Utiliti Bangunan* Building Utilities
3.	BMKV 4133	*Kejuruteraan Perkhidmatan Bangunan* Building Services Engineering
4.	BMKV 4143	*Teknik Penyelenggaraan Bangunan* Building Maintenance Technique
5.	BMKV 4213	*Pengenalan Senibina dan Rekabentuk Kapal* Introduction to Ship Design and Architecture
6.	BMKV 4223	*Sistem Teknologi Marin* Marine Technology System
7.	BMKV 4233	*Teknologi Kapal Kecil* Small Craft Technology
8.	BMKV 4243	*Pemeriksaan dan Penyelenggaraan Marin* Marine Inspection and Maintenance
9.	BMKV 4323	*Teknologi Air dan Air Sisa* Water and Waste Water Technology
10.	BMKV 4333	*Teknologi Pengurusan Sisa Pepejal* Solid Waste Management Technology
11.	BMKV 4343	*Teknologi Kualiti Udara dan Kawalan Pencemaran* Air Quality and Pollution Control Technology
12.	BMKV 4353	*Pengurusan Sisa Industri dan Sisa Berjadual* Industrial and Hazardous Waste Management

*** For General elective, students may choose any ONE (1) COURSE from the list below:

CODE	COURSE NAME
BLHW 1722	*Falsafah Sains Dan Teknologi* Philosophy of Science and Technology
BLHH 1032	*Psikologi Industri dan Organisasi* Industrial Psycology and Organization
BLHC 4012	*Komunikasi Keorganisasian* Organizational Communication
BLHC 4022	*Kemahiran Perundingan* Negotiation Skills

For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

CODE	CERTIFICATE NAME
BMMD 3100	Certified Solidworks Associate
BMCG 2520	AutoCAD Professional Certification

ACADEMIC HANDBOOK SESSION 2023/2024

FOR BACHELOR DEGREE PROGRAMMES

COMPULSORY COURSES FOR INTERNATIONAL STUDENTS

FTKM

FACULTY OF TECHNOLOGY AND MECHANICAL ENGINEERING

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

1-

COMPULSORY COURSES FOR INTERNATIONAL STUDENTS

International students are required to register nine (9) university compulsory courses that are equivalent to 16 credits. The list of courses that they have to register is as shown in Table 1. All of the courses are delivered in English language.

Table 1: List of Compulsory Courses for Undergraduate Programme for International Students

NO.	CODE	COURSE	CREDIT
Academic English		Academic English (No IELTS/TOEFL/MUET)	9 months/ 6 months/ 3 months
1.	BLLW 1142	English for Academic Purposes	2
2.	BLLW 2152	Academic Writing	2
3.	BLLW 3162	English for Professional Interaction	2
4.	BLLW 1172	Communicative Malay Language I	2
5.	BIPW 1762	Philosophy and Current Issues	2
6.	BIPW 2752	*Malaysian Culture*	2
7.	BLLW 1212	Arabic Language I	2
	BLLW 1222	Mandarin Language I	
	BLLW 1232	Japanese Language I	
	BLLW 1242	Korean Language I	
	BLLW 1252	German Language 1	
8.	BKK* 1**1	Co-curiculum I	1
9.	BKK* 1**1	Co-curiculum II	1
TOTAL CREDIT			**16 credit**

Minimum English Language Requirements

International students whose first language is not English are required to obtain an appropriate score in an approved examination in English language (such as IELTS, TOEFL, Malaysian University English Test - MUET) before they can embark on an academic programme. Applicants need to show either a standard or a higher level of ability in English.

Academic English Language Programme

If the students do not have the required standard of English, the University may offer them a pre-sessional Academic English Language programme conducted by the Centre for Languages and Human Development to meet required scores in order to gain admission for their undergraduate and postgraduate degrees at UTeM. Applicants need to achieve a minimum of 5.0 for IELTS, 500 for TOEFL or Band 3.0 for MUET.

Exemptions

Exemptions from this requirement will be considered for applicants:
1. Whose native language is English.
2. Who have studied a degree programme in Malaysia, if it is taught in English.

For the co-curriculum courses, students who have registered for co-curriculum I (for example, Football) are **not allowed** to take the same course for co-curriculum II. However, students who failed in the co-curriculum course can register for other co-curriculum course.

With respect to the third language courses, such as Arabic, Mandarin, Japanese, Korean and German, there are three conditions that need to be followed:
1. Students **are not allowed** to register in their native language;
2. Students who failed in their third language course have the option to register in a third language course different from the earlier course taken; and
3. Students who intend to improve their grade in course taken have to take the same course.

ACADEMIC HANDBOOK SESSION 2023/2024

FOR BACHELOR DEGREE PROGRAMMES

SUMMARY OF COURSES ENGINEERING TECHNOLOGY PROGRAMMES

FTKM

FACULTY OF TECHNOLOGY AND MECHANICAL ENGINEERING
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

1-

UNIVERSITY COMPULSORY COURSES (W)

BKKX XXX1
COCURRICULUM I & COCURRICULUM II/
KOKURIKULUM I & KOKURIKULUM II

LEARNING OUTCOMES

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

1. Apply the technique in the relevant field.
2. Demonstrate the ability to participate in a team in the relevant field.

***LIST OF FIELDS**

CODE	COURSE
BKKC 1061	Koir
BKKC 1141	Silat Gayong
BKKC 1601	Gamelan
BKKC 1611	Cak Lempong
BKKC 1631	Nasyid
BKKC 1641	Seni Khat
BKKC 1761	Kompang
BKKC 1791	Catur
BKKE 1451	Perniagaan Sukan
BKKE 1461	Agropreneur
BKKE 1551	Keusahawanan
BKKE 1561	Fiqh Muamalat
BKKI 1531	Reka Cipta
BKKI 1781	Seni Foto
BKKL 1391	Pengurusan Kendiri
BKKL 1411	Pengurusan Kesihatan
BKKL 1501	Aplikasi Falak Dalam Ibadah
BKKM 1501	Rakan Polis
BKKM 1561	Budi Penyayang
BKKM 1811	Fiqh Amali
BKKM 1821	Tahsin Al-Quran
BKKM 1831	Prs & Sahabat Khidmat
BKKM 1911	Kelestarian Amalan Hijau
BKKM 1921	Pengurusan Tenaga Elektrik
BKKM 1931	Teknologi Hijau Dan Alam Sekitar
BKKP 1741	Pengucapan Awam (Bahasa Melayu)
BKKS 1011	Bola Sepak
BKKS 1031	Bola Tampar
BKKS 1071	Sepak Takraw
BKKS 1091	Senamrobik
BKKS 1101	Badminton
BKKS 1141	Kembara
BKKS 1151	Berbasikal
BKKS 1281	Hoki
BKKS 1311	Sofbol
BKKS 1351	Bola Baling
BKKS 1361	Ragbi
BKKS 1501	Petanque
BKKV XXXX	Kor SUKSIS
BKKV XXXX	Kor SISPA
BKKV XXXX	Kelana Siswa
BKKV 1571	Bulan Sabit Merah
BKKV XXXX	PALAPES
BKKV 1851	Pertolongan Cemas

***Remark: Subject to change by IPTK**

BLLW XXX2
THIRD LANGUAGE/
BAHASA KETIGA

LEARNING OUTCOMES

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

1. Demonstrate the ability to converse in third language (selected) with correct and accurate pronunciation and respond to it accordingly.
2. Construct sentences with correct grammar and demonstrate writing skills.
3. Interpret the information in the simple text.

LIST OF COURSES*

CODE	COURSE
BLLW 1212	Bahasa Arab I
BLLW 1222	Bahasa Mandarin I
BLLW 1232	Bahasa Jepun I
BLLW 1242	Bahasa Korea I
BLLW 1252	Bahasa Jerman 1

Remark: Subject to change by CELL/ *PPB

BLLW 1142
ENGLISH FOR ACADEMIC PURPOSES/
BAHASA INGGERIS UNTUK AKADEMIK

LEARNING OUTCOMES

By the end of the course, students should be able to:

1. Apply correct grammar rules according to context.
2. Demonstrate knowledge of various reading skills in the reading tasks given.

SYNOPSIS

This course aims to develop students' reading skills and grammar. A variety of academic reading texts and reading skills are explored to facilitate students' comprehension of the texts. These reading skills are also necessary in assisting students to master study skills. Grammar elements are taught in context to develop students' accuracy in the use of the language. This course also includes elements of blended learning.

REFERENCES

1. Pattison, T. (2015). Critical Reading: English for Academic Purposes. Pearson Higher Education & Professional Group.
2. de Chazal, E., & Rogers, L. (2013). Oxford EAP: A Course in English for Academic Purposes. Oxford: Oxford University Press.
3. Paterson, K. & Wedge, R. (2013). Oxford Grammar for EAP. Oxford: Oxford University Press.

BLLW 2152
ACADEMIC WRITING/
PENULISAN AKADEMIK

LEARNING OUTCOMES

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

1. Prepare clear and detailed descriptions of a product related to fields of interest.
2. Express arguments systematically in a composition.
3. Prepare short reviews of technical materials.

SYNOPSIS

This course aims to equip the students with the skills to communicate clear and detailed viewpoints in writing. The students are expected to have a stand on topics of their fields by providing advantages and disadvantages to support their arguments. From time to time, consultations with the students will be conducted throughout the completion of their assignments. This serves as the formative evaluation in the course. Grammar components are embedded in the course to support the required writing skills. Blended learning is incorporated in this course.

REFERENCES

1. Blass, L & Vargo, M. (2018). Pathways: Reading, Writing, and Critical Thinking 3. Mason: Cengage Learning, Inc
2. de Chazal, E., & Rogers, L. (2012). Oxford EAP: A Course In English For Academic Purposes. Oxford: Oxford University Press.
3. Paterson, K. & Wedge, R. (2013). Oxford Grammar for EAP. UK: Oxford University Press.

PRE-REQUISITE

BLLW 1142
ENGLISH FOR ACADEMIC PURPOSES/
BAHASA INGGERIS UNTUK AKADEMIK

BLLW 3162
ENGLISH FOR PROFESSIONAL INTERACTION/
BAHASA INGGERIS UNTUK INTERAKSI PROFESIONAL

LEARNING OUTCOMES

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

1. Listen and infer based on situations in context.
2. Respond to standard spoken language using communication strategies.
3. Display detailed descriptions by expanding and supporting points of view using relevant examples.

SYNOPSIS

This course which is designed based on a blended and student-centred learning approach aims to develop students' listening skills as well as communication skills and strategies. Among the elements covered are professional interactions that include group discussion and public speaking. Students are also required to express ideas with relevant examples in public speaking and online assessments. They are also exposed to the rudiments of grammar implicitly via the communicative activities.

REFERENCES

1. Fry, R. (2016). 101 Smart Questions To Ask On Your Interview. U.K.: New Page Books.
2. Cooper, S. (2016). 100 Tricks To Appear Smart In Meetings: How To Get By Without Even Trying. Andrews McMeel Publishing.
3. Hood, J.H. (2013). How To Book Of Meetings: A Complete Guide For Every Business. South Australia: Magill.
4. Carmine, G. (2014). Talk like TED: The 9 Public-Speaking Secret Of The World's Top Minds. New York: St Martins Press.
5. Jason, S.W. (2013). Workplace Communication For The 21st Century: Tools And Strategies That Impact The Bottom Line. California: Praeger.

PRE-REQUISITE

BLLW 2152
ACADEMIC WRITING/
PENULISAN AKADEMIK

BLHW 1762
PHILOSOPHY AND CURRENT ISSUES/
FALSAFAH DAN ISU SEMASA

LEARNING OUTCOMES

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

1. Explain current issues based on philosophy, National Education Philosophy and Rukun Negara.
2. Explain current issues based on major thought streams in various philosophical streams.
3. Explain current issues through the perspective of comparative philosophy as the basis for establishing inter-cultural dialogue.

SYNOPSIS

This course covers the relationship of philosophy with the Philosophy of National Education and Rukun Negara. The use of philosophy as a tool to purify the culture of thought in life through art and thinking methods as well as human concepts. The main topics in philosophy namely epistemology, metaphysics and ethics are discussed in the context of current issues. Emphasis is given to philosophy as the basis for inter-cultural dialogue and fostering common values. At the end of this course, students will be able to see the disciplines of knowledge as a comprehensive body of knowledge and related to each other.

REFERENCES

1. Dzulkifli, A. R. & Rosnani, H (2019). New Interpretation of National Education Philosophy and Its Implementation Post 2020. Kuala Lumpur: IIUM Press.
2. Rosnani Hashim (2017). Revitalization of Philosophy and Philosophical Inquiry in Muslim Education. Gombak: Kull of Education, IIUM.
3. Al-Attas, S. M. Naquib (1991). The Concept of Education in Islam. Kuala Lumpur: ISTAC.

BLHW 2772
APPRECIATION OF ETHICS AND CIVILIZATIONS/
PENGHAYATAN ETIKA DAN PERADABAN

LEARNING OUTCOMES

At the end of this course, students will be able to:

1. Explain the theory and concept of ethics from different perspectives of civilization.
2. Explain the importance of contemporary issues related to various fields according to the mold of ethics and civilization.
3. Discuss the system, level of development, social and cultural progress across cultures for Malaysia.

SYNOPSIS

This course discusses the theories and concepts of knowledge, ethics and civilization based on the comparison of systems, social and cultural progress across diverse cultures. In addition, this course also explains about contemporary issues related to various fields according to the mold of ethics and civilization. This course approach can build Malaysians who come from various cultural backgrounds across cultural values to produce human culture with good values.

REFERENCES

1. Puga, I. & Easthope R. (2017). An analysis of C. Wright Mills's The sociological imagination. London: Routledge.
2. MacKinnon, B. (2015). Ethics: Theory and Contemporary Issues (8th) ed). Stamford CT: Cengage Learning.

BTMW 4012
TECHNOLOGY ENTREPRENEURSHIP/
KEUSAHAWANAN TEKNOLOGI

LEARNING OUTCOMES

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

1. Recognize the importance of entrepreneurship, the role of entrepreneurship in today's society, and the technical knowledge of the entrepreneurial process.
2. Explain the basic concepts of interdisciplinary competences in management, and create technology-based businesses.
3. Present a business plan project and develop an entrepreneurial profile.

SYNOPSIS

The course provides students with technological knowledge about entrepreneurship as well as the skills to turn such knowledge into practice. The teaching and learning (T&L) activities include case study and field work with the aim to inculcate entrepreneurship values and entrepreneurship acculturation with a view to successfully launch and subsequently manage their enterprises. Students will be exposed with the support systems available or government agencies in starting new ventures, including the tactics commonly employed by entrepreneurs starting a business. The course allows students to critically evaluate business in terms of technical feasibility, investment potential, and risks.

REFERENCES

1. Barringer, B.R, and Ireland, R.D. (2012). Entrepreneurship 4th Edition. Pearson.
2. Scarborough, N.M. (2011). Essentials of Entrepreneurship and Small Business Management 6th.Edition. Pearson.
3. UiTM Entrepreneurship Study Group. Revised Edition (2010). Fundamentals of Entrepreneurship. Pearson.

BLHC 4032
CRITICAL AND CREATIVE THINKING/
PEMIKIRAN KRITIS DAN KREATIF

LEARNING OUTCOMES

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

1. Identify basic principles of critical and creative thinking skills.
2. Analyze collected and traceable information to make decisions.
3. Form a new concept or idea of a solution.

SYNOPSIS

This course is designed to give students an introduction to the principles of critical and creative thinking, and problem-solving. Students will be exposed to the roles of the right brain and left brain, mental determination, elements of critical and creative thinking as well as problem solving. This course is conducted in accordance with the concept of problem-based learning (PBL).

REFERENCES

1. Aziz Yahya, Aida Nasirah Abdullah, Hazmilah Hasan, Raja Roslan Raja Abd Rahman. (2011) Critical and Creative Thinking Module 2. Melaka. Penerbit UTeM.
2. Buzan, T. & Buzan, B. (2006). The Mind Map Book, Essex: BBC Active, Pearson Education.
3. Claxton, G. & Lucas, B. (2007). The Creative Thinking Plan, London: BBC Books.
4. Reichenbach, W. (2000). Introduction to Critical Thinking, McGraw-Hill College.

GENERAL ELECTIVE COURSES (W)

BLHW 1722
PHILOSOPHY OF SCIENCE AND TECHNOLOGY/
FALSAFAH SAINS DAN TEKNOLOGI

LEARNING OUTCOMES

At the end of this course, students will be able to:

1. Explain the importance of the concept of knowledge in the philosophy of science and technology.
2. List the challenges and importance of global issues regarding science and technology that have an impact on society and global life.

SYNOPSIS

This course discusses the concept of knowledge in philosophy, science and technology that targets the importance of knowledge according to Islamic and Western scholars. In addition, this course also emphasizes on methodology in Islamic science, concepts and achievements of Islamic civilization in various fields as well as applying the challenges and importance of global issues regarding science and technology that are growing and impacts in society and global life. This course is able to open the minds of students to life in a team to form a wave of creative human thinking.

REFERENCES

1. Nor Azaruddin Husni Hj Nuruddin. (2017). Challenging Issues for Science & Technology In Malaysia an Overview. Kuala Lumpur: Institut Kefahaman Islam Malaysia.
2. Abdul Rahman Abdullah. (2010). Wacana Falsafah Sains Sejarah Dan Pemikiran. Pulau Pinang: Pusat Kajian Pengurusan Pembangunan Islam Universiti Sains Malaysia.
3. Daniel Zainal Abidin. (2007). Meneroka Kecemerlangan Quran daripada Teropong Sains. Selangor: PTS Milennia.
4. Nik Salida Suhaila Nik Saleh, et.al. (2007). Sains Islam Merentasi Zaman. Nilai: Universiti Sains Islam Malaysia.
5. Yahaya Jusoh & Azhar Muhammad. (2007). Pendidikan Falsafah Sains Al-Quran. Johor: Penerbit Universiti Teknologi Malaysia.

BLHC 4012
ORGANIZATIONAL COMMUNICATION/
KOMUNIKASI KEORGANISASIAN

LEARNING OUTCOMES

At the end of this course, students will be able to:

1. Discuss the basic principles of organizational communication skills for the purpose of interaction within the organization.
2. Provide feedback on issues related to the development of organizational communication skills.
3. Solve organizational communication problems based on the context of the actual organizational environment.

SYNOPSIS

This course will expose students to the basic ideas of organization in general and organizational communication. In addition, students will also be able to know the theories related to organizational communication and understand the important elements in the organization such as leadership, formal communication and informal communication. In addition, students will be aware of barriers, problem solving and decision making skills in organizational communication. Eventually, students will have an understanding of organizational climate, technological and organizational relationships and corporate communication within the organization.

REFERENCES

1. Miller, K. (2012). Organizational Communication. (4rd. ed). Belmont: Thomson Wadsworth Publishing Company.
2. Dennis K. Mumby (2018). Organizational Communication: A Critical Approach. (2nd ed). SAGE Publications, Incorporated.

BLHH 1032
INDUSTRIAL AND ORGANIZATIONAL PSYCHOLOGY/ PSIKOLOGI INDUSTRI DAN ORGANISASI

LEARNING OUTCOMES

At the end of this course, students will be able to:

1. Relate environmental processes and theories in the workplace in the world of organization and industry.
2. Demonstrate leadership characteristics in group assignment activities.
3. Respond to the role and responsibilities as a prospective employee in the organization.

SYNOPSIS

This course provides exposure to the psychological aspects of the world of work in the industrial sector as well as problems related to behavior in the organization. There are several topics discussed including current issues in workplace psychology, personnel planning, workplace stress and engineering psychology.

REFERENCES

1. Schultz & Schultz, Duane (2017). Psychology and Work Today. New York: Prentice Hall.
2. Azlina A. B. (2016). Industrial Psychology and Human Resource Management. Terengganu: Universiti Malaysia Terengganu Publishers.

BLHC 4022
NEGOTIATION SKILLS/ KEMAHIRAN PERUNDINGAN

LEARNING OUTCOMES

At the end of this course, students will be able to:

1. Identify basic concepts in the negotiation process using effective communication practices.
2. Conclude on the best consulting techniques based on various theoretical approaches.
3. Solve consulting issues based on effective consulting skills techniques based on various situations.

SYNOPSIS

This course will discuss the basic concepts of consultation, critical and creative thinking techniques, effective communication techniques and effective listening and questioning techniques. Students are also exposed to the knowledge and skills needed to carry out and manage the various consultation processes effectively. In addition, critical and creative thinking skills, as well as the effective communication skills required to carry out the consultation process will also be discussed.

REFERENCES

1. Lemiwki, R., Barry, B. & Saunders, D. (2016). Essentials Of Negotiation. USA: McGraw Hill Education.
2. Covey, S. (2013) The 3rd Alternative: Solving Life's Most Difficult Problems. New York: Free Press
3. Fisher, R & Ury. (2011). Getting To YES: Negotiating Agreement Without Giving In. Third Edition. Penguin Books.

PROGRAMME CORE COURSES (P)

BELG 1013
TECHNICAL MATHEMATICS/
MATEMATIK TEKNIKAL

LEARNING OUTCOMES

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

1. Explain the concepts of matrices, trigonometry, complex numbers and three-dimensional vector operations.
2. Use appropriate methods to solve matrices, trigonometry, complex numbers and three-dimensional vector operations.
3. Solve application problems using appropriate techniques.

SYNOPSIS

This course has four components; matrices, trigonometry, complex numbers and three-dimensional vector operations. In matrices, it covers some fundamental concepts such as determinants, inverses of square matrices and techniques for solving systems of linear equations using matrices. In trigonometry, the use of trigonometric identities to solve trigonometric equations and its applications will be emphasized. In complex numbers, it covers some fundamental concepts of imaginary numbers and its representations on the complex plane, as well as the representations of the polar and exponential forms of the complex numbers. Three-dimensional coordinate system and vectors operations will also be introduced. This includes the concepts of the dot and the cross products of vectors.

REFERENCES

1. Samsudin, A., Mukhtar, M.F., Hairol Anuar, S.H. & Irianto I. (2021). Introductory: Technical Mathematics for Engineering Technology (2nd Edition). Penerbit UTeM.
2. Miller, J. & Gerken, D. (2016). College Algebra & Trigonometry. Mcgraw-Hill Education.
3. Sullivan, M. (2019). Algebra And Trigonometry, Loose-Leaf Edition (11th ed.). Pearson Education.
4. Lial, M.L., Hornsby, J., Schneider, D.I. & Daniels, C. (2016). College Algebra And Trigonometry. Global Edition, Pearson Education Limited.
5. Larson, R. (2016). Algebra And Trigonometry With Calchat And Calview (10th ed,). Brooks Cole.

BMIG 1023
CALCULUS FOR TECHNOLOGY/
KALKULUS UNTUK TEKNOLOGI

LEARNING OUTCOMES

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

1. Use appropriate methods to find the limits and continuity of a function.
2. Use appropriate methods to differentiate and integrate various functions.
3. Solve application problems using appropriate techniques.

SYNOPSIS

This course introduces the differential and integral calculus of a single variable, with applications. The topics covered are limits and continuity of a function, the derivative with all techniques and methods to differentiate, applications of differentiation such as approximation, related rates, maximum and minimum values, as well as optimization problems. Integration covers methods like substitution, integration by parts, integration by partial fraction decomposition and trigonometric substitution. While its applications cover the area of a bounded region or area between curves as well as the volume of a solid of a revolution.

REFERENCES

1. Azmi, E.F., Zainal, N.A., Hamzah, K. & Said, R.M. (2020). Elementary Calculus For Technology, Module For Engineering Technology Degree Programmes. Penerbit UTeM.
2. James, S. (2016). Calculus (8th ed.). Cengage Learning.
3. Joel, H., Maurice, D.W. & Thomas, G.B. (2016). University Calculus: Early Transcendentals (3rd ed.). Pearson Education.
4. Zill, D.G. & Dewar, J.M. (2016). Essentials of Precalculus with Calculus Previews. Jones and Bartlett Publishers.
5. Larson, R. & Edwards, B. (2014). Calculus (10th ed.). Boston, MA Brooks.
6. Komzsik, L. (2014). Applied Calculus of Variations for Engineers. Boca raton, FL CRC Press.

BMKG 2033
APPLIED CALCULUS FOR TECHNOLOGY/ KALKULUS GUNAAN UNTUK TEKNOLOGI

LEARNING OUTCOMES

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

1. Apply the basic knowledge of vector functions and multivariable calculus to solve the related problems.
2. Use appropriate methods to find the solutions of the differential equations.
3. Solve application problems using appropriate techniques.

SYNOPSIS

This course has two parts. The first part introduces the vector-valued functions which include the derivative, integration, arc length and curvature of vector functions, partial derivatives that include limits and continuity, chain rule, and maximum and minimum values, and multiple integrals which include the double and triple integrals of multivariable functions. The second part of the course covers the solutions of ordinary differential equations. The topics include solving the first order differential equations using the separable, exact differentiation, and linear equations methods. While solutions of the second order equations covers the homogeneous and the non-homogeneous equations using the undetermined coefficients methods and variation parameters.

REFERENCES

1. Stewart, J., Clegg, D.K., & Watson, S. (2020). Calculus: Early Transcendentals. Cengage Learning.
2. Anton, H., Bivens, I.C., & Davis, S. (2016). Calculus: late Transcendental. John Wiley & Sons.
3. Stewart, J., Clegg, D.K., & Watson, S. (2021). Multivariable Calculus. Cengage Learning.
4. Zill, D.G. (2016). Differential Equations with boundary-value problems. Nelson Education.
5. James, S. (2016). Calculus (8th Edition). Cengage Learning.

BERG 2043
STATISTICAL METHODS/
KAEDAH STATISTIK

LEARNING OUTCOMES

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

1. Apply the knowledge of probability and statistics to solve the related problems.
2. Solve problems in statistical inferences related to hypothesis testing, regression and ANOVA.
3. Execute some real problems using Microsoft Excel data analysis application.

SYNOPSIS

This course covers the concept of probability and statistics and their real application problems. Probability topics include all the basic concepts of probability such as events and probability, mutually exclusive events, independent events, multiplication rule, addition rule, conditional probability, discrete and continuous random variables. The inferential statistics covers topics like sampling, hypothesis testing, correlation, simple linear regression, chi-square independent test and ANOVA. Students will be exposed to statistical data analysis application in Microsoft Excel to solve real application questions.

REFERENCES

1. Hasim, N.A.H., Hussin, N.H., Ahmad, A. & Miswan, N.H. (2019). Statistical Methods for Technology, (Work Book) for Engineering Technology Degree Programs. Penerbit UTeM.
2. Paolella, M.S. (2018), Fundamental Statistical Inference: A Computational Approach. John Wiley & Sons, Incorporated. ISBN: 9781119417880 (EBook).
3. Steyer, R. & Nagel, W. (2017), Probability and Conditional Expectation: Fundamentals for the Empirical Sciences, John Wiley & Sons, Incorporated. ISBN: 9781119243502 (EBook).
4. Hahn, G.J., Meeker, W.Q. & Escobar, L.A. (2017). Statistical Intervals: A Guide for Practitioners and Researchers (2nd ed.). John Wiley & Sons, Incorporated. ISBN: 9781118594957. (EBook)
5. Rohatgi, V.K. & Saleh, A.K.E. (2015). An Introduction to Probability and Statistics (3rd ed.). John Wiley & Sons, Incorporated. ISBN: 9781118799659 (EBook).

BMIU 4053
ENGINEERING ETHICS & OCCUPATIONAL SAFETY, HEALTH, AND ENVIRONMENT (OSHE)/
ETIKA KEJURUTERAAN & KPPP

LEARNING OUTCOMES

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

1. Perform the principles of professional ethics and various behavior or conduct that need to be observed, control and solve by a professional engineering technologist.
2. Practice the occupational safety and health that the employees exposed themselves in the workplace environment and how to prevent the hazard.
3. Explain the responsibilities of engineering technologies in the scope of their function in any organization either as an employee or as an employer and have a feeling of being responsible to the society and the environment.

SYNOPSIS

This course will discuss the concept and cases of engineering ethics ; Introduction to professional ethics, engineering ethics as preventive ethics, framing the ethical problems, methods for moral problem solving, creative middle ways, organizing principles, utilitarian concept, minimalist views, respect for persons, reversibility, universal ability, responsible engineering technologists, reasonable care, good works, honesty, integrity, reliability, conflict of interest, engineering technologist as employees, engineering technologist as employers, engineers and environment, international engineering professionalism. At the end of the course, the student will be taught on the OSHA, critical safety and health hazards, first aids procedures and practice, its organization and how the OSHA manage to monitor the safety and the health effectively, case study on the occupational safety and health.

REFERENCES

1. Harris, C. E., Michael S. Pritchard, and Michael J. Rabins. Engineering Ethics: Concepts and Cases. Belmont, CA: Wadsworth, 2009. Print.
2. Fleddermann, C. B. (2014). Engineering Ethics (4th ed.). Pearson.
3. Martin, M. K. & Schinzinger, R. (2010). Engineering Ethics (2nd ed.). McGraw-Hill.
4. Undang-undang Malaysia. Akta 768, Akta Teknologis dan Juruteknik (2015). Occupational Safety and Health Act, 1994
5. Factories and Machinery Act, 1967.

BMKA, BMKH AND BMKM PROGRAMME CORE COURSES (P)

BMMM 1062
PHYSICS/
FIZIK

LEARNING OUTCOMES

At the end of this course, student should be able to:

1. Explain the basic laws and comprehend the basic concept of physic.
2. Show the understanding of physics concepts systematically by accurate measurement.
3. Discuss the importance of physics concepts in application of energy management.

SYNOPSIS

The topics covers in this course are; Forces, Acceleration and Newton's Second Law of Motion, Motion with a Changing Velocity, Circular Motion, Conservation of Energy, Linear Momentum, Fluids, Elasticity and Oscillations, Heat, electric Forces and Fields, Electric Potential, Electric Current and Circuits, Magnetic Forces and Field, Electromagnetic Induction.

REFERENCES

1. Raymond A. Serway and John W. Jewett, 2018, Physics for Scientists and Engineers, Chapter 1-39, Brooks Cole Cengage Learning.
2. John D. Cutnell and Kenneth W. Johnson, 2012, Physics, Wiley.
3. Douglas C. Giancoli, 2009, Physics for Scientists & Engineers with Modern Physics 4th Edition, Prentice Hall.
4. Giambatista, A., Richardson, B.M and Richardson R.C., 2010, College Physics 2nd Edition, Mc-Graw Hill.

COURSE DETAILS FOR JTKM PROGRAMMES

BMKA COURSE CORE COURSES (K)

SEMESTER 1

BMKT 1413
ENGINEERING GRAPHICS/
GRAFIK KEJURUTERAAN

LEARNING OUTCOMES

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

1. Apply fundamental of technical drawing to produce standard mechanical part and assemblies drawing documents.
2. Construct typical mechanical engineering drawing using CAD software.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

The course concentrates on computer aided design (CAD) software. AutoCAD engineering drawing software is used to produce standard engineering drawing. The students will be exposed to cad interface, editing commands, coordinate system, template preparation and layer in order to produce various types of engineering drawings.

REFERENCES

1. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. and Novak, J. E.,Lockhart S., 2016, Technical Drawing With Engineering Graphics, 15th Ed., Pearson & Prentice Hall, New Jersey.
2. Mark Dix, Paul Riley, 2017, Discovering Autocad 2017, Prentice Hall, London.
3. Scott Onstott, 2013, Autocad 2014 And Autocad Lt 2014 Essential, John Wiley & Sons, Inc.
4. Cheryl R. Shrock And Steve Heather, 2014, Beginning Autocad 2015, Industrial Press, Inc.

BMKT 1613
ENGINEERING MATERIALS/
BAHAN KEJURUTERAAN

LEARNING OUTCOMES

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

1. Explain the structures, properties and processing of engineering materials.
2. Display the ability to determine the microstructures and mechanical properties of various materials.
3. Construct the solution for engineering material problems.

SYNOPSIS

This course introduces basic concepts of engineering materials that covers introduction to engineering materials, inter-atomic bonding, crystalline structure and imperfections in solid. Explanation on different type of engineering materials (i.e. metal, polymer, ceramic, composite and semiconductor), its mechanical properties, basic application and processing are also included. Introduction to the binary phase diagrams (composition and microstructure correlation) is also given.

REFERENCES

1. Callister W.D. and Rethwisch D.G, 2011, Fundamentals of Materials Science and Engineering, 8th Edition, John Wiley & Sons.
2. Smith W. F., 2011, Foundation of Materials Science and Engineering, 5th Edition, Mcgraw Hill.
3. Askeland D. R., 2011, The Science and Engineering of Materials, 6th Edition, Cl-Engineering.
4. Serah, A. M., 2017, Engineering Materials for Engineering Technologist. Melaka: Universiti Teknikal Malaysia Melaka.

SEMESTER 2

BMKT 1713
PRINCIPLE OF ELECTRIC & ELECTRONIC/
PRINSIP ELEKTRIK & ELEKTRONIK

LEARNING OUTCOMES

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

1. Explain the basic electrical and electronic concept in solving circuits problem.
2. Develop electrical circuits and measure voltage, current and resistance using appropriate instruments.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

This course will cover on the topics of electrical and electronic components, emphasizing on electric circuit theory such as components and measurement instruments, circuit analysis. For electronic principle, it will cover on the topics of electronic devices such as operational amplifiers and digital electronics it will deals with topics such as system numbers, logic gates, boolean operation, combination logic circuits, and digital circuit application.

REFERENCES

1. Thomas L. Floyd, 2014, Principles Of Electric Circuits, 9th Ed., Prentice Hall.
2. Thomas L.Floyd, 2015, Digital Fundamental, 11th Ed., Pearson Education.
3. Alexander, C.K. and Sadiku, Matthew N. O, 2017, Fundamental Of Electric Circuit, 6th Ed., Mcgraw Hill.
4. Nilsson, J. W. and Riedel, S. A., 2015, Electric Circuit, 10th Ed., Prentice Hall.
5. Roger Tohkeim, 2014, Digital Electronics Principles & Applications, 8th Ed., Mcgraw Hill.

BMKT 2423
MODELING AND COMPUTER ANALYSIS/
PERMODELAN DAN ANALISIS BERKOMPUTER

LEARNING OUTCOMES

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

1. Apply fundamental of engineering and technical drawing in mechanical design using advance CAD tools.
2. Conduct computer modelling, design and analysis using advanced CAD tools.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

This course will empower the students with fundamental knowledge and technical skills of 3d solid modelling skills using industry-proven 3d mechanical cad software. The students will learn about the different techniques for creating surface and solid models with emphasis on design intent. The course includes hands-on exercises and best practice methods for students to interpret common error messages during part, assembly and drafting stages.

REFERENCES

1. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. And Novak, J. E.,Lockhart S., 2016, Technical Drawing With Engineering Graphics, 15th Ed., Pearson & Prentice Hall, New Jersey.
2. Lombard, Matt, 2019, Mastering SolidWorks, John Wiley & Sons, Inc.
3. Planchard, D. & M. Planchard, Engineering Design With Solidworks 2017, Mission, Kansas : SDC Publications.com, 2017.
4. Kirstie Plantenberg (2011), Introduction To Catia V5 Release 19 (A Hands-On Tutorial Approach), Schroff Development.

PRE-REQUISITE

BMKT 1413
ENGINEERING GRAPHICS/
GRAFIK KEJURUTERAAN

BMKT 1313
STATICS/
STATIK

LEARNING OUTCOMES

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

1. Describe the physical sciences of statics concepts.
2. Construct statics experiments to recognize the engineering mechanics of statics principles.
3. Explain effectively as an individual and assist group members for experimental and assignment works.

SYNOPSIS

An introduction to the basic concept of statics as physical sciences, system of units, scalars and vectors, free body diagram, forces system, force system resultants and moment, equilibrium of a particle, equilibrium of a rigid body, structural analysis (trusses analysis and simple frames and machines), friction and center of gravity and centroid.

REFERENCES

1. Hibbeler R.C., 2017, Engineering Mechanics Statics, 14th SI Ed., Prentice Hall, New York.
2. Beer, F. P. And Johnston Jr., E. R. And Eisenberg, E. R., 2015, Vector Mechanics for Engineers - Statics, 11th Ed. in SI Units, Mcgraw Hill, New York.
3. Meriam, J. L. and Kraige L. G., 2014, Engineering Mechanics Static SI Version, 8th Ed., John Wiley & Sons, New York.
4. Pytel and Kiusaalas. 2017. Engineering Mechanics-Static. 4th Ed. Cengage Learning.
5. Michael P., Gary G., F. Constanzo 2013. Engineering Mechanics- Statics, 2nd Ed., McGraw-Hill Higher Education.

BMKT 1623
MANUFACTURING PRACTICES/
AMALAN PEMBUATAN

LEARNING OUTCOMES

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

1. Describe proper use of basic engineering equipments and requirement.
2. Build product based on technical drawing that meet specific tolerance.
3. Perform the process according to the proper procedure.

SYNOPSIS

The practice consists of introduction to basic knowledge of using manual hand tools and equipment, machine tools, welding, fabrication, lathe, milling, and some manual work within manufacturing daily activities. It introduces common equipments for performing manufacturing works such as lathe and milling machine, arc welding, tig/mig welding, sheet metal forming etc. Due to its nature as introductory course, students are required to prepare at home before having the practice to acquire any knowledge concerning the practices.

REFERENCES

1. Kalpakjian, S. and Schmid R. (2014), Manufacturing Engineering and Technology, 7th Edition, Prentice Hall.
2. Mikell P. Groover, Fundamentals of Modern Manufacturing Materials, Processes, and Systems, 4th Edition, John Wiley & Sons, 2010.
3. Mikell P. Groover, Principles of Modern Manufacturing SI Version, 5th Edition, John Wiley & Sons, 2013.

SEMESTER 3

BMKT 2633
MEASUREMENT AND INSTRUMENTATION/
PENGUKURAN DAN INSTRUMENTASI

LEARNING OUTCOMES

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

1. Analyse the basic elements of common measurement systems.
2. Perform suitable measurement methods for a given issue.
3. Measure the performance of a measurement system.

SYNOPSIS

Measurement and instrumentation course covers three main areas; dimensional metrology, measurement analysis, and surface/texture measurement. In the dimensional metrology, students will be expose to three types of measurements; linear, angle and geometrical. Besides that, measurement of screw thread also covered in this course. Students will be taught from basic measuring instruments and will be introduced to the usage of the high precision measuring instruments that are Coordinate Measuring Machine and CNC Roundness measuring. In the measurements analysis, students will be required to describe the standard Measurement, measurement process, process capability, measurement errors, limits, tolerances and fits. In surface/texture measurement, students will perform the measurement of surface texture.

REFERENCES

1. Lau Kok Tee, and Saiful Naim Sulaiman (2020) Dimensional Measurement and Instrumentation for Technologist, Penerbit Universiti, Universiti Teknikal Malaysia Melaka
2. Connie, D. (2015). Fundamentals of Dimensional Metrology, 6th Edition. Cengage Learning.
3. Kalpakjian, S., Schimd, S. R., (2014). Manufacturing Engineering and Technology, 7th Edition. Prentice Hall.
4. Bucher, J. L. (2012). The Metrology Handbook, 2nd Edition. SQ Quality Press.
5. Campbell, R. G., Roth, E. S. (2002). Integrated Product Design and Manufacturing Using Geometrical Dimensioning and Tolerancing. Marcel Dekker, Inc.

BMKT 1723
COMPUTER PROGRAMMING/
PENGATURCARAAN KOMPUTER

LEARNING OUTCOMES

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

1. Describe and convert the problems into the appropriate solutions.
2. Solve problems using software engineering principles.
3. Complete code by applying suitable programming structures in a group assignment

SYNOPSIS

In this course, students will be exposed to the basic principles of computer and software development methodology. The course also includes basic principles of programming such as syntax, semantic, compiling, and linking. Students will also learn programming techniques using C++ such as data type, operator, selection, repetition, function, array, file, and pointer.

REFERENCES

1. Abdul Kadir, (2016) C++ programming: a practical hands-on for self-learning, Penerbit Universiti, UTeM.
2. Gaddis, T., (2018), Starting Out with C++: From Control Structures through Objects, 8th Edition, Global Edition, Pearson Education.
3. Daniel Liang, Y, (2013), Introduction to Programming with C++, 3rd Edition, Pearson Education.
4. Deitel, H.M. and Deitel, P.J., (2010), C++ How to Program,9th Edition, Pearson Education.
5. Nell, D., (2014), Programming and Problem Solving with C++: Comprehensive, 6th Edition, Jones & Bartlett Learning.

BMKA 2213
MANUFACTURING TECHNOLOGY/
TEKNOLOGI PEMBUATAN

LEARNING OUTCOMES

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

1. Explain the fundamental concepts of manufacturing processes.
2. Display the ability of various manufacturing processes.
3. Integrate various skills of manufacturing techniques as an individual or a group.

SYNOPSIS

In this course, students will be introduced to commonly used manufacturing technologies that can be widely categorized into four major focus areas; metal removal processes, near-net shape and forming processes, joining processes and surface treatment process. For the metal removal processes, the students will be exposed to turning, milling and abrasive machining. In the area of near-net shape and forming processes, wide range of processes will be introduced such as casting, rolling, forming, forging and extrusion. In addition to that near-net-shape processes for plastic, ceramic and metal powder will also be covered. And finally, the joining processes will familiarize the students to fusion and solid state welding. This course covers most commonly used manufacturing technology in Malaysia, as a fundamental knowledge and skills in preparing student for manufacturing industries.

REFERENCES

1. S. Kalpakjian, S.R. Schmid, Manufacturing Engineering and Technology SI Edition, Prentice Hall, 2014.
2. M.P. Groover, Fundamentals of Modern Manufacturing. Materials, Processes and Systems 5th Edition, John Wiley & Sons, Inc, 2014.
3. M. P. Groover, Introduction To Manufacturing Processes, 3rd Edition, Hoboken, NJ: Wiley, 2012.
4. P. N. Rao, Manufacturing Technology Foundry, Forming and Welding, 4th Ed., Mc Graw Hill, 2013.
5. P. N. Rao, Manufacturing Technology Metal Cutting and Machine Tools, 3rd Ed., Mc Graw Hill, 2013.
6. Amitabha Ghosh, Asok Kumar Mallik, Manufacturing Science, EWP New Dehli, 2010.

BMKT 2333
DYNAMICS & MECHANICS OF MACHINE/
DINAMIK & MEKANIK MESIN

LEARNING OUTCOMES

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

1. Describe the concept and principle of dynamics and mechanics of machine element.
2. Demonstrate the dynamics and mechanics of machine laboratory experiments.
3. Synthesize dynamics and mechanics of machine into engineering practices.

SYNOPSIS

Introduction to basic principles based on kinematic and kinetic dynamics. The concept of displacement, distance, velocity, speed and acceleration. Application of newton's second law. The principle of work and energy, impulse and momentum of particles and rigid bodies. Transmission system based on the friction of motion, such as belts, brakes and dibble. Based delivery systems such as chains and gear teeth. Gear system. Balancing the dynamic system that includes balancing the body rotating plane and a parallel plane. Balancing of reciprocating motion as the body line of engines, radial engines and engine Gyroscopic motion that includes a couple gyroscope. Gyro scope coupling effects. Simple harmonic motion and vibration consists of moving one degree of freedom. Free vibration. Damped free vibration. Forced damped vibration. Speed control of the cycle flywheel.

REFERENCES

1. Beer, F. P., Johnson, E.R., Clausen, W. E., (2013) Vector Mechanics For Engineers, Dynamics Si Units, 10th Edition. Mcgraw-Hill.
2. Hibbeler, R. C. (2013) Engineering Mechanics, Dynamics, 12th Edition. Prentice Hall.
3. Meriam, J. L. And Kraige, L. G. 2013. Engineering Mechanics, SI Version, 7th Edition. John Wiley.
4. Bedford, A. and Fowler, W. 2008. Engineering Mechanics: Dynamics (SI Units). 5th Edition.Prentice Hall.
5. Cleghorn, W. L., 2005, Mechanics of Machines, Oxford University Press.

PRE-REQUISITE
BMKT 1313
STATICS/ STATIK

BMKT 2513
THERMODYNAMICS/
TERMODINAMIK

LEARNING OUTCOMES
Upon completion of this course, student should be able to:
1. Apply the basic concepts of thermodynamics, the First Law of Thermodynamics and the Second Law of Thermodynamics to closed and open systems.
2. Follow instructions in laboratory sheets when conducting thermodynamic experiments.
3. Complete individual or group assignments within the time given.

SYNOPSIS
This course covers the basic concepts and definitions of engineering thermodynamics, energy, work and heat, properties of pure substances (relationships of *P-v, T-v, P-T* and *T-s* diagrams), First Law of Thermodynamics, Second Law of thermodynamics and Entropy.

REFERENCES
1. Cengel, Y. A. and Boles, M. A..2014. Thermodynamics: An Engineering Approach, 8th Ed, McGraw Hill. Singapore.
2. S.C. Gupta,2008. Thermodynamics, 1st Ed, Pearson Education(Singapore) Pte. Ltd
3. Sonntag, R.E., Borgnakke. C, Van. and Gordon J., 2008. Fundamentals of Thermodynamics, 7th Edition, John Wiley & Sons, Inc.New York.
4. Eastop, T. D., And Mcconkey, A., 2011, Applied Thermodynamics for Engineering Technologists, 5th Ed, Pearson & Prentice Hall. New York.

SEMESTER 4

BMKT 2433
ENGINEERING DESIGN/
REKA BENTUK KEJURUTERAAN

LEARNING OUTCOMES
At the end of this course, the students should be able to:
1. Categorize the methods and design concepts used in the engineering design process.
2. Composes a working design prototype to meet specified needs with appropriate consideration on the learned methods in the engineering process.
3. Develop an awareness of project management in the engineering design process.

SYNOPSIS
The methodology of design solutions and best practices in product design. Latest product development: the determination of market needs, determination design specifications, engineering concept generation, concept selection, detailed product specification, functional analysis, material selection. Innovative solutions. Creativity in the industry design, design visualization and anthropometric. Portfolio preparation and presentation.

REFERENCES
1. Ulrich, K. T. and Eppinger, S. D. 2016. Product Design and Development, New York McGraw-Hill Education.
2. Rudolph J Eggert, Second Edition 2005. Engineering Design. Pearson Prentice Hall.
3. Ullman, D.G. 2016.The Mechanical Design Process, 5th Ed., New York McGraw-Hill Education.
4. Cross, N., 2008. Engineering Design Methods: Strategies for Product Design, 4th Ed., John Wiley And Sons, West Sussex UK.

BMKT 2323
SOLID MECHANICS/
MEKANIK PEPEJAL

LEARNING OUTCOMES

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

1. Apply the knowledge and principles of mechanics of materials in engineering design.
2. Display appropriate experimental techniques in mechanics of material through laboratory experiments.
3. Demonstrate the ability to complete engineering project using the principle of mechanics of material in group effectively.

SYNOPSIS

The course contains topics of introduction, stress, strain, hooke's law, bending, mechanical properties, transformation of stress, axial load, transformation of strain torsion, beam bending, transverse shear, combined loadings, deflection of beams and shafts and Mohr's circle.

REFERENCES

1. Hibbeler R.C., 2013, Statics and Mechanics of Materials, 3rd SI Ed., Prentice Hall, New York.
2. Beer. F.P. Et Al. 2012. Mechanics Of Materials, 6th Edition in SI Units. Mcgraw-Hill.
3. Beer. F.P. Et Al. 2011. Statics and Mechanics of Materials, 1st Edition. Mcgraw-Hill.
4. Beer, F. P. And Johnston Jr., E. R. and Eisenberg, E. R., 2010, Vector Mechanics For Engineers - Statics, 9th Ed. in SI Units, Mcgraw Hill, New York.
5. Roy Craig Jr., 2011, Mechanics of Materials, 3rd Ed., John Wiley & Sons, New York.

PRE-REQUISITE

BMKT 1313
STATICS / STATIK

BMKT 2523
FLUID MECHANICS/
MEKANIK BENDALIR

LEARNING OUTCOMES

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

1. Apply fluid mechanics concept in solving fluid statics and fluid dynamics problem.
2. Measure related parameter by using appropriate techniques in fluid mechanics application.
3. Demonstrate the ability to complete tasks and assignment as a leader or a member in group effectively.

SYNOPSIS

Introduction to this course is about the basic physical properties of fluids. Then it covers the definition of pressure and head. Next it followed by derivation of hydrostatic equation and its application in pressure measurement, static forces analysis on immersed surface and buoyancy analysis. For fluid dynamics, it started with introduction to fluid dynamics and fluid flow analysis. Then it is continued by derivation of flow equations, the application of energy equation and bernoulli equation in the calculation of flow velocity, discharge, and head lost in piping systems. The last topic for this course is dimensional analysis and its application.

REFERENCES

1. Munson, B. R., Young D. F. and Okiishi, T. H., 2012, Fundamentals of Fluid Mechanics, 7th Ed., John Wiley & Sons, Inc, Asia.
2. Som, S. K. and Biswas, G., 2010, Introduction to Fluid Mechanics and Fluid Machines, Revised 2nd Ed., Tata McGraw-Hill, New Delhi.
3. Douglas, J. F., Gasiorek J. M. and Swaffield, J. A., 2011, Fluid Mechanics, 6th Ed., Prentice Hall, Spain.
4. Kundu, P. K., Cohen, I. M. and Dowling, D. R., 2011, Fluid Mechanics, 5th Ed., Academic Press, Waltham, USA.

BMKT 2733
MICROPROCESSOR TECHNOLOGY/
TEKNOLOGI MIKROPEMPROSES

LEARNING OUTCOMES

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

1. Describe the basic concepts of digital system, combinational and sequential logic circuit.
2. Explain the microprocessor fundamental, internal architecture of microprocessor and programming technique.
3. Demonstrate the ability to complete tasks and assignment in group effectively.

SYNOPSIS

This course will essentially divide into two sections; digital electronics and microprocessor. The first section covers topics on digital electronic that include Introduction to Digital Concepts, Logic Gates, Combinational Logic and Data Control Devices Flip Flops and Sequential Logic Circuits. The next section will deal with topics such as Microprocessor Fundamentals, Introduction to Intel 8085 Microprocessor Hardware, Introduction to Intel 8085 Microprocessor Software and Programming Techniques with Additional Instructions.

REFERENCES

1. Thomas L. Floyd, 2015, Digital Fundamentals, 11th Edition, Prentice Hall.
2. Ramesh S. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085, 5th Edition, Prentice Hall, 2002.
3. William Kleitz, Digital and Microprocessor Fundamental, 4th Edition, Prentice Hall, 2003.
4. Barry B. Brey, The Intel Microprocessor, 8th Edition, Prentice Hall, 2009.
5. Charles M. Gilmore, Microprocessors: Principles and Applications, 2nd Edition, Mcgraw-Hill,1996.

SEMESTER 5

BMKT 3743
CONTROL & INSTRUMENTATION/
KAWALAN & INSTRUMENTASI

LEARNING OUTCOMES

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

1. Explain the dynamic behaviour and the details of the system through the analysis of the response system, response and stability of frequency.
2. Display the concept of controller and sensor elements/ transducer through learning and application of the device behaviour.
3. Explain effectively either individually or in group for any assignment and experiment.

SYNOPSIS

Introduction to Control System. Mathematical Modelling. Time Response. Stability of linear feedback system. Improve transient response and steady-state error: PID control. Root locus. Introduction to measurement and instrumentation. Static nature of performance measurement and instrumentation. Analysis of experimental data. Experimental uncertainty analysis. Signal Measurement system.

REFERENCES

1. Alan S. Moris and Reza Langari, Measurement and Instrumentation: Theory and Application, Academic Press, 2011.
2. HS Kalsi, Electronic Instrumentation, McGraw Hill, 2011.
3. Uday A. Bakshi and Ajay V. Bakshi, Electrical Measurements and Instrumentation, Technical Publication, 2014.
4. Norman S. Nise, Control Systems Engineering, 6th Edition, John Wiley & Sons Inc., 2011.
5. Richard C. Dort, Robert H. Bishop, Modern Control Systems, 12th Edition, Pearson, 2011.
6. Gopal, M, Control Systems: Principles and Design, 4th Edition, Mc Graw Hill, 2012. 7. Khalil Azha Mohd Annuar et. al., Control & Instrumentation, Penerbit UTeM, 2015.

BMKA 3313
VEHICLE BRAKE SYSTEM/
SISTEM BREK KENDERAAN

LEARNING OUTCOMES

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

1. Explaining the concept, operation and maintenance of existing automotive brake system and a combination of latest regenerative brake system.
2. Demonstrate the concept, operation and maintenance of existing and latest automotive brake systems.
3. Perform a case study on automotive braking system in team.

SYNOPSIS

This course provides an introduction to the basic knowledge of hydraulic brake system comprising the existing system and the combination of latest braking control. This course will assist students to understand the basic theory of brake operation, diagnosis, identify problems and repair procedures. This course is also touch on the phenomenon of vibration and noise on the brakes in practice and theory as well as identifying the ways to solve the problem encounter. Among the topic cover: basic operating system and brakes, brake system maintenance, mechanical brake, hydraulic brake control, anti-lock braking system with electronic brake distribution, regenerative braking control, brake noise and vibration issues.

REFERENCES

1. Hassan, M.Z. 2017 Fugitive Modelling of Braking Noise, UTeM Press.
2. Dietsche, K. H. & Klingebiel, M. 2011. Bosch Automotive Handbook, 8th Edition, Warrendale, PA Robert Bosch GmbH.
3. Reza N. Jazar, 2013, Vehicle Dynamics: Theory and Application, 2nd Ed., New York Springer.
4. Orthwein, 2004. Clutches And Brakes: Design And Selection. 2nd Edition. Marcel Dekker. Basel, New York.

BMKA 3113
INTERNAL COMBUSTION ENGINE/
ENJIN PEMBAKARAN DALAMAN

LEARNING OUTCOMES

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

1. Classify the functions of major automotive engine subsystems.
2. Dismantle and assemble engine to diagnose engine malfunctions.
3. Demonstrate good working relation with team members.

SYNOPSIS

This module aims to expose students to the operation of the internal combustion engine technology. The course also discuss how the service, repair, maintenance, design and test the performance of conventional internal combustion engines. In addition, students have to solve engineering problems in real time by leveraging their knowledge and learn new information to solve problems of related engines.

REFERENCES

1. Ganesan, V., 2012. Internal Combustion Engine. 4th ed. McGraw Hill, USA.
2. Gupta, H.N. 2013. Fundamentals of Internal Combustion Engine, 2nd Ed. Prentice Hall, India.
3. Society of Automotive E, 2007 Transmissions & Drivelines. SAE International, USA.
4. Birch, T.W. 2012. Automatic Transmission and Transaxles. Prentice Hall.
5. Malcolm James Nunney, 2008. Light and Heavy Vehicle Technology, Macmillan Company, UK.
6. Anthonye. Schwaller, 2005, Total Automotive Technology, Thomson Delmar Learning, USA.

BMKA 3123
VEHICLE POWERTRAIN MANAGEMENT SYSTEM/
SISTEM PENGURUSAN KUASA KENDERAAN

LEARNING OUTCOMES

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

1. Investigate the input and output signals come from sensors and actuators in powertrain subsystem.
2. Fix the fault cause by sensors and actuators in powertrains system.
3. Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development.

SYNOPSIS

This course will be discussed on theory, operation and application on engine and transmission management system. Topics will be covered are electronic fuel injection (EFI), diesel management system, engine control unit (ECU), on-board diagnostic system, electronic transmission control system and sensor or actuators inside powertrain management system.

REFERENCES

1. V.A.W. Hilllier, Peter Coombes, David Rogers, 2007, Hillier. S Fundamental of Motorvehicle Technology: Book 2 Powertrain Electronics, 5th Edition, Nelson Thornes.
2. Bosch. R., 2006, Gasoline-Engine Management: System and Components, 3rd Edition, Wiley.
3. Bosch, R., 2005, Diesel-Engine Management: System and Components, 4th Edition, Wiley.
4. Bosch, R., 2011, Bosch Automotive Handboook, 8th Edition, Warrendale, PA Robert Bosch GmbH.

BMKA 3223
VEHICLE DYNAMICS/
DINAMIK KENDERAAN

LEARNING OUTCOMES

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

1. Explain the basics of vehicle handling/ride and primary factors that affect it.
2. Constructs mathematical model using the computer software in modelling vehicle dynamics.
3. Demonstrate physical and mathematical model to predict the dynamic response of a vehicle.

SYNOPSIS

To discuss an introduction and the basic concept of vehicle dynamics, fundamental approach towards vehicle dynamics modelling, vehicle response to various driver and ambient inputs, road loads, mechanics of tire, relation between ride and handling, steering and suspension system.

REFERENCES

1. James Balkwill, 2018. Performance vehicle dynamics: Engineering and applications. Oxford: Butterworth-Heinermann
2. Giancarlo Genta & Alessandro Genta, 2017. Road vehicle dynamics: Fundamental of modeling and simulation. World Scientific Publishing Co. Pte. Ltd
3. Dean Karnopp, 2013. Vehicle Dynamics, Stability, and Control 2nd Edition, Crc Press.
4. Rajesh Rajamani, 2012. Vehicle dynamics and control, 2nd edition. New York Springer
5. Georg Rill, 2012. Road Vehicle Dynamics: Fundamental and Modeling, Boca Raton, Florida CRC Press

BMKA 3323
HVAC FOR AUTOMOTIVE/
HVAC UNTUK AUTOMOTIF

LEARNING OUTCOMES

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

1. Apply basic concept of air conditioning in Automotive HVAC System.
2. Performs testing, servicing and troubleshooting in Automotive HVAC.
3. Explain the environmental law, safety and social responsibility that correlate with Automotive HVAC.

SYNOPSIS

This course is to prepare the students with comprehensive knowledge on heating, ventilating, and air conditioning (HVAC) system of automotive application. The topics covered in this course are automotive heating and air conditioning, basic air conditioning system and its components, coolant agent. Apart from that, the regulations set by the department of environment (DOE) and department of occupational safety & health (DOSH) are also being exposed to students. Last but not least, apart from hands on training, students will also be taught on how to service the air conditioning and heating system, repairing air conditioning and HVAC electronic controlled system.

REFERENCES

1. Chris Johanson, 2015, Auto heating and Air Conditioning, The Goodheart-Willcox Company, Inc, Tinley Park, Illinois.
2. Roger W. Haines, C. Lewis Wilson, 2010. HVAC Systems Design Handbook Mcgraw-Hill: New York.
3. Mike Stubblefield, John H. Haynes, 2011. The Haynes repair manual for automotive heating and air-conditioning systems. North America, USA Haynes.
4. Guy W. Gupton. 2002. HVAC Controls: Operation & Maintenance. Fairmont Press: Lilburn, GA.
5. Boyce H. Dwiggins. 2001. Automotive Heating and Air Conditioning. Delmar Thomson Learning: Albany, NY.

SEMESTER 6

BMKT 3214
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA I

LEARNING OUTCOMES

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

1. Apply Knowledge to proposal preparation of industry-based or practice- priented project.
2. Imitate appropriate existing concepts in engineering technology fields.
3. Adhere to project's dateline and related procedure.
4. Explain the project proposal in oral and written forms effectively.
5. Report literature review and preliminary findings in a scientific manner.

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem-based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Bachelor Degree Project Manual, Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan, Universiti Teknikal Malaysia Melaka.

BMKA 4253
VEHICLE DESIGN AND SIMULATION/
REKA BENTUK DAN SIMULASI KENDERAAN

LEARNING OUTCOMES

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

1. Propose solutions to be used in solving a finite element analysis (FEA) problem.
2. Adapt pre-processing, solving and post processing methods in CAE standard software to solve a specific problem. Adapt pre-processing, solving and post processing methods in CAE standard software to solve a specific problem.
3. Demonstrate effectively either as a member or leader in group to solve problems using CAE tools.

SYNOPSIS

This module is intended to study the modelling, simulation and analysis of vehicle systems by using computational aided engineering (CAE) standard software. It covers general study of two major fields of CAE: finite element analysis (FEA) and computational fluid dynamics (CFD). From the linear and non-linear analysis on mechanical components, design optimization to wind tunnel analysis. This module also covers the application of CAE in vehicle design and development. Altair hyperworks software is used accordance to its widely uses in automotive industry for meshing and its general-purpose solvers.

REFERENCES

1. Saeed Moaveni (2015) Finite Element Analysis: Theory and Application with ANSYS, 4th Ed., Boston: Pearson Higher Education Inc.
2. Blundell M.V and Harty D. (2006) Multibody System Approach to Vehicle Dynamics, Elsevier Butterworth-Heinemann.
3. Wong J. Y. (2008) Theory of Ground Vehicles, 4th Ed. John Wiley & Sons.
4. Johnston, B. (2010) Vector Mechanics for Engineer -Dynamics, 9th Ed. Boston, MA McGraw-Hill Education.
5. Hibbeler R C (2017) Engineering Mechanics – Static, 14th Ed. Essex, England: Pearson Education Limited.

BMKA 3333
AUTOMOTIVE SAFETY & COMFORT SYSTEM/
SISTEM KESELAMATAN & KESELESAAN AUTOMOTIF

LEARNING OUTCOMES

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

1. Differentiate automotive safety & comfort system based on its application.
2. Construct simulation of automotive safety and comfort system experiments.
3. Demonstrate effectively either individually or in group for any assignment and experiment.

SYNOPSIS

This course will focus on theory, operation and application for automotive safety and comfort system in modern vehicle. Topics discussed include active safety system such as antilock braking system, traction control system, electronic stability program, and adaptive cruise control, as well as passive safety system such as supplemental restraint system and occupant protection system. Besides, driving assistance system and basic human factor engineering or ergonomics are also discussed.

REFERENCES

1. Bosch, R., 2006, Safety, Comfort and Convenience Systems, 3rd Edition, Wiley.
2. Bosch, R., 2011, Bosch Automotive Handboook, 8th Edition, Warrendale, PA Robert Bosch GmbH.
3. Jurgen, Ronald K., 2006, Adaptive Cruise Control, Warrendale, PA SAE International.
4. Julian Happian-Smith. 2002. An Introduction to Modern Vehicle Design. Burlington, MA SAE International.
5. Vivek D. Bhise, (2012). Ergonomics in The Automotive Design Process, Boca Raton, FL CRC Press.

BMKA 3343
AUTOMOTIVE ELECTRIC & ELECTRONIC SYSTEM/
SISTEM ELEKTRIK & ELEKTRONIK AUTOMOTIF

LEARNING OUTCOMES

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

1. Implement electrical and electronic system in automotive application.
2. Assemble electrical and electronic equipment appropriate for experiments.
3. Demonstrate the ability to complete tasks and assignment as a leader or a member in group effectively.

SYNOPSIS

This course focuses on theory, operation and application of electrical and electronic automotive system. Topics covered include vehicle electrical wiring system, sensors and actuators, battery charging system, starter system, lighting system, chassis electrical system, additional system, mechatronics, automotive network and the CAN-bus system.

REFERENCES

1. Tom Denton, 2018, Automobile Mechanical & Electrical Systems, Abingdon, Oxon: Routledge.
2. Ehsani Mehrdad et.al, 2018, Modern Electric, Hybrid Electric, And Fuel Cell Vehicles, Boca Raton, FL: CRC Press.
3. Halderman, Juames D., 2016, Hybrid and Alternative Fuel Vehicles, 4th Ed., Boston, MA Pearson
4. Bosch, R., 2007, Automotive Electrics-Automotive Electronics: Systems and Components, Bently.
5. Bosch, R., 2011, Bosch Automotive Handboook, 8th Edition, Warrendale, PA Robert Bosch GmbH.

BMKM 4353
OIL & WEAR DEBRIS ANALYSIS/
ANALISIS MINYAK DAN SERPIHAN

LEARNING OUTCOMES

After completing the course, students will be able to:

1. Analyze oil and wear debris using various oil analysis methods to determine oil quality.
2. Integrate the data collected through various oil analysis methods in order to analyze failures & cause of parameter changes in the oil.
3. Demonstrates problem solving of real-life condition regards to oil analysis issues in a group assignment.

SYNOPSIS

This course the discuss role of oil and wear debris analysis as a method that applied in machinery maintenance. Properties of oil properties such as density, viscosity, etc are introduced. The effect of temperature and other factor that affects oil degradation during the machine operation are discussed. Standard testing and analysis method typically employed to characterize oil properties are introduced in this course. This course also discusses basic analysis method on wear debris samples resulting from the machinery components interactions that can be used to identify and troubleshoot the machines problem. Method of collecting oil and wear debris samples at regular rate also introduced.

REFERENCES

1. H. P. Bloch and F.K. Gentner, 2012. Machinery Failure Analysis and Troubleshooting, 4th Ed. Vol.2, Butterworth-Heinemann.
2. J. Denis, J. Briant, And J.C. Hipeaux, 2000, Lubricant Properties and Testing, Edition Technip.
3. R. C Mortier, M. F. Fox, S.T. Orszulik, 2012, Chemistry and Technology of Lubricants, Springer.
4. B. Bhushan, 2000, Modern Tribology Handbook, CRC Press.

BMKT 3543
PNEUMATIC AND HYDRAULIC TECHNOLOGY/
TEKNOLOGI HIDRAULIK DAN PNEUMATIK

LEARNING OUTCOMES

After completing the course, students will be able to:

1. Apply knowledge of engineering fundamentals in order to analyse performance of hydraulic and pneumatic system
2. Construct hydraulic and pneumatic system manually and using software.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams

SYNOPSIS

This course covers the introduction of the hydraulic and pneumatic systems, types of pump, compressor and their working principles, types of valve, actuator and their usage, performance of the fluid power system, others fluid power system ancillaries and sensors, fluid power system circuit design and analysis with manual control and electrical control, fluid power symbols, the usage of computer software to design and simulate the fluid power system circuit, the usage of programmable logic controller in fluid power system circuit design and the application of fluid power in robotic and mobile hydraulic.

REFERENCES

1. Esposito A. 2009. Fluid Power with Applications. 7th Ed., New Jersey : Pearson Prentice Hall.
2. Noack, Steffen, 2001. Hydraulics in mobile equipment, SAE Society of Automotive Engineers.
3. Watson, Ben, 2011. Modern diesel technology mobile equipment hydraulics:a systems and troubleshooting approach, Delmar Cengage Learning.
4. Erjavec, Jack, 2015. Automotive technology a systems approach, 6th Ed., Clifton Park, NY: Cengage Learning

SEMESTER 7

BMKT 4224
BACHELOR DEGREE PROJECT II/
PROJEK SARJANA MUDA II

LEARNING OUTCOMES

After completing the course, students will be able to:

1. Discuss solution to the proposed industry-based or practice-oriented project.
2. Demonstrate project findings using appropriate techniques with an understanding of its limitations.
3. Display self-reliance in working independently and cooperates in group activities.
4. Display the ability to present the project findings in oral and written forms effectively.
5. Report literature review and project potential in scientific manner with a recognition of the strengths, weaknesses and opportunity for improvements.

SYNOPSIS

This is the second part of the Bachelor Degree Project. Students are expected to continue the project done in Bachelor degree Project Part 1 till completion. At the end of the semester students are required to submit the Bachelor Degree Project report both orally and in writing for assessment.

REFERENCES

1. Bachelor Degree Project Manual, Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE

BMKT 3214
BACHELOR DEGREE PROJECT I/
PROJECT SARJANA MUDA I

BMKA 4233
VEHICLE SUSPENSION SYSTEM/
SISTEM PENGGANTUNGAN KENDERAAN

LEARNING OUTCOMES

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

1. Construct the vehicle suspension and steering system and predict the suspension and steering design factor performances.
2. Demonstrate standard suspension and steering tests and measure the system performances.
3. Demonstrate good working relation with team members.

SYNOPSIS

Introduction to chassis load and tire contact forces. Modelling of chassis dynamics in vertical, lateral and longitudal directions. Performance criteria in suspension design. The use of suspension test machine for investigating the suspension characteristics. Effects of suspension parameters to the chassis dynamics. Semi-active and active suspension system.

REFERENCES

1. John C. Dixon, 2009, Suspension geometry and computation, Chichester John Wiley & Sons.
2. Emanuele Guglielmino, Tudor Sireteanu, Charles W. Stammers, Gheorghe Ghita. Marius Giuclea, 2010, Semi-Active Suspension Control: improved vehicle ride and road friendliness, London: Springer-Verlag London Limited.
3. August P. Staiforth, 1999, Design, Construction and Tuning of Car Suspension, Hayness Press.
4. Module: Vehicle Suspension System for Technologist.

BMKA 4133
ENGINE PERFORMANCE/
PRESTASI ENJIN

LEARNING OUTCOMES

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

1. Associate the historical development with the future trend of engine.
2. Measure the basic engine parameter and emission.
3. Demonstrate teamwork effectively in accomplishing any assignment or experiment.

SYNOPSIS

History of vehicle engines and transmissions. Engine geometry. Performance parameters of gas exchange for 4-stroke and two stroke. Spark ignition engine combustion. The market situation for the development of vehicles, gearboxes and components. The selection of the transmission ratio of the vehicle. Basic approach to the performance of automotive engines, power conversion, adjustment of the engine and transmission, transmission system design principles.

REFERENCES

1. Pickerill, Ken, 2018. Today's Tecnician: Automotive Engine Performance. 7th Ed. Boston, Massachusetts: Cengage Learning.
2. Bosch, R., 2007, Automotive Electrics-Automotive Electronics : Systems and Components, 5th Edition, Stuttgart, Professional Engineering publishing.
3. Victor Hillier, Peter Coombes, 2007: Fundamentals of motor vehicle technology, Oxford University Press.
4. Richard D. Atkins, 2009, An Introduction to Engine Testing and Development, Warrendale, PA SAE International.
5. Hüseyin Abut, John H. L. Hansen, Kazuya Takeda, 2007, Advances for in-vehicle and mobile systems, New York, NY Springer.

BMKA 4143
VEHICLE TRANSMISSION SYSTEM/
SISTEM TRANSMISI KENDERAAN

LEARNING OUTCOMES

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

1. Analyze the vehicle transmission system based on general and specific transmission design principles.
2. Complete transmission mechanism experiment with confidence.
3. Demonstrate teamwork effectively in accomplishing any assignment or experiment.

SYNOPSIS

Vehicle transmission design engineering has been enriched with many variations, such as automatic transmissions, continuously variable transmissions (CVT), the torque converter clutch transmission, dual clutch transmission, four-wheel drive transmission. The purpose of this course is to explain the development of a motor vehicle transmission as part of the development of vehicle systems. The aim is to explain the basic relationship between the drive unit, motor and transmission system and transmission system functions such as selecting the appropriate gear, the right gear, power profile, fuel consumption, life and reliability.

REFERENCES

1. Naunheimer, Harald, Bertsche, Bernd, Ryborz, Joachim, Novak, Wolfgang, 2014. Automotive transmissions: fundamentals, selection, design and application, Berlin: Springer.
2. Erjavec, J., 2011. Automatic Transmissions and Transaxles. Clifton Park, NY Delmar Cengage Learning.
3. Erjavec, J., 2011. Manual Transmissions and Transaxles, New York: Delmar Cengage Learning.
4. Fischer R, Kucukay F, Jrgens G, Najork R and Pollak B, 2015. The Automotive Transmission Book, Switzerland: Springer International Publishing.
5. Mashadi, Behrooz & Crolla, David, 2012. Vehicle powertrain systems, Chichester Wiley.

BMMA 4723
LEAN PRODUCTION SYSTEM/
SISTEM PENGELUARAN KEJAT

LEARNING OUTCOMES

At the end of this course, student should be able to:

1. Examine the lean practices for manufacturing.
2. Perform lean waste analysis effectively to identify and eliminate the types of waste apparent in a manufacturing system.
3. Construct a value stream map to fit a situation or specific problem using lean manufacturing tool and techniques.

SYNOPSIS

Lean Production System is based upon the principle of eliminating waste at all levels throughout the production system. This module reviews the skills and techniques required to analyze production system and to design improved methods and layouts. It will use Value Stream Mapping to understand and appraise the current state; future state mapping will be used to develop a vision of value-added flow. The focus of this module will be on the application of the technique through studies and industrial experience.

REFERENCES

1. Fredendall, Lawrence D. and Thurer, M., 2016. An Introduction to Lean Work Design: Standard Practices and Tools of Lean, Volume II. Business Expert Press: New York, USA.
2. William A. Levinson., 2013. Lean management system LMS: a framework for continual lean improvement. Boca Raton, FL: CRC Press.
3. Santos, S., Wysk, R.A and Torres, J.M., 2006. Improving Production with Lean Thinking. John Wiley and Sons, Inc.: New Jersey, USA.
4. Tapping, D., Luyster,T. and Shuker, T, 2002 Value Stream Management, Productivity Press.
5. Womack, J. P. and Jones, D.T., 2003. Lean Thinking, Simon & Schuster.
6. Shingo, S., 1989. A study of the Toyota Production System from an Industrial Engineering Viewpoint, Productivity Press.

SEMESTER 8

BMKT 4236
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME

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

1. Build technical competencies, knowledges, skills and attitude for life long learning.
2. Prepare a report on the industrial field daily activities in the log book systematically.
3. Develop effective communication with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS

All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES

1. UTeM Guideline Handbook for Industrial Training.

BMKT 4246
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME

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

1. Produce industrial training report
2. Present report orally on working experience

SYNOPSIS

All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE

Student required to pass Industrial Training BMMU 4786 in order to pass Industrial training report.

REFERENCES

1. UTeM Guideline Handbook for Industrial Training.

BMKH COURSE CORE COURSES (K)

SEMESTER 1

BMKT 1413
ENGINEERING GRAPHICS/
GRAFIK KEJURUTERAAN

LEARNING OUTCOMES

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

1. Apply fundamental of technical drawing to produce standard mechanical part and assemblies drawing documents.
2. Construct typical mechanical engineering drawing using CAD software.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

The course concentrates on computer aided design (CAD) software. Autocad engineering drawing software is used to produce standard engineering drawing. The students will be exposed to cad interface, editing commands, coordinate system, template preparation and layer in order to produce various types of engineering drawings.

REFERENCES

1. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. and Novak, J. E.,Lockhart S., 2016, Technical Drawing With Engineering Graphics, 15th Ed., Pearson & Prentice Hall, New Jersey.
2. Mark Dix, Paul Riley, 2017, Discovering Autocad 2012, Prentice Hall, London.
3. Scott Onstott, 2013, Autocad 2014 And Autocad Lt 2014 Essential, John Wiley & Sons, Inc.
4. Cheryl R. Shrock And Steve Heather, 2014, Beginning Autocad 2015, Industrial Press, Inc.

BMKT 1613
ENGINEERING MATERIALS/
BAHAN KEJURUTERAAN

LEARNING OUTCOMES

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

1. Explain the structures, properties and processing of engineering materials.
2. Display the ability to determine the microstructures and mechanical properties of various materials.
3. Construct the solution for engineering material problems.

SYNOPSIS

This course introduces basic concepts of engineering materials that covers introduction to engineering materials, interatomic bonding, crystalline structure and imperfections in solid. Explanation on different type of engineering materials (i.e. metal, polymer, ceramic, composite and semiconductor), its mechanical properties, basic application and processing are also included. Introduction to the binary phase diagrams (composition and microstructure correlation) is also given.

REFERENCES

1. Callister W.D. and Rethwisch D.G, 2011, Fundamentals of Materials Science and Engineering, 8th Edition, John Wiley & Sons.
2. Smith W. F., 2011, Foundation of Materials Science and Engineering, 5th Edition, Mcgraw Hill.
3. Askeland D. R., 2011, The Science and Engineering of Materials, 6th Edition, Cl-Engineering.
4. Serah, A. M., 2017, Engineering Materials for Engineering Technologist. Melaka: Universiti Teknikal Malaysia Melaka.

BMKT 2633
MEASUREMENT AND INSTRUMENTATION/
PENGUKURAN DAN INSTRUMENTASI

LEARNING OUTCOMES

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

1. Analyse the basic elements of common measurement systems.
2. Perform suitable measurement methods for a given issue.
3. Measure the performance of a measurement system.

SYNOPSIS

Measurement and instrumentation course covers three main areas; dimensional metrology, measurement analysis, and surface/texture measurement. In the dimensional metrology, students will be expose to three types of measurements; linear, angle and geometrical. Besides that, measurement of screw thread also covered in this course. Students will be taught from basic measuring instruments and will be introduced to the usage of the high precision measuring instruments that are Coordinate Measuring Machine and CNC Roundness measuring. In the measurements analysis, students will be required to describe the standard Measurement, measurement process, process capability, measurement errors, limits, tolerances and fits. In surface/texture measurement, students will perform the measurement of surface texture.

REFERENCES

1. Lau Kok Tee, and Saiful Naim Sulaiman (2020) Dimensional Measurement and Instrumentation for Technologist, Penerbit Universiti, Universiti Teknikal Malaysia Melaka.
2. Connie, D. (2015). Fundamentals of Dimensional Metrology, 6th Edition. Cengage Learning.
3. Kalpakjian, S., Schimd, S. R., (2014). Manufacturing Engineering and Technology, 7th Edition. Prentice Hall.
4. Bucher, J. L. (2012). The Metrology Handbook, 2nd Edition. SQ Quality Press.
5. Campbell, R. G., Roth, E. S. (2002). Integrated Product Design and Manufacturing Using Geometrical Dimensioning and Tolerancing. Marcel Dekker, Inc.

BMKT 1313
STATICS/
STATIK

LEARNING OUTCOMES

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

1. Describe the physical sciences of statics concepts.
2. Construct statics experiments to recognize the engineering mechanics of statics principles.
3. Explain effectively as an individual and assist group members for experimental and assignment works.

SYNOPSIS

An introduction to the basic concept of statics as physical sciences, system of units, scalars and vectors, free body diagram, forces system, force system resultants and moment, equilibrium of a particle, equilibrium of a rigid body, structural analysis (trusses analysis and simple frames and machines), friction and center of gravity and centroid.

REFERENCES

1. Hibbeler R.C., 2017, Engineering Mechanics Statics, 14th SI Ed., Prentice Hall, New York.
2. Beer, F. P. And Johnston Jr., E. R. And Eisenberg, E. R., 2015, Vector Mechanics for Engineers - Statics, 11th Ed. in SI Units, Mcgraw Hill, New York.
3. Meriam, J. L. and Kraige L. G., 2014, Engineering Mechanics Static SI Version, 6th Ed., John Wiley & Sons, New York.
4. Pytel and Kiusaalas. 2017. Engineering Mechanics-Static. 3rd Ed. Cengage Learning.
5. Michael P., Gary G.,F. Constanzo 2013. Engineering Mechanics- Statics. Mcgraw-Hill Higher Education.

SEMESTER 2

BMKT 1623
MANUFACTURING PRACTICES/
AMALAN PEMBUATAN

LEARNING OUTCOMES

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

1. Demonstrate proper use of all equipment and requirement.
2. Produce product based on technical drawing that meet specific tolerance.
3. Perform the process according to the proper procedure.

SYNOPSIS

The practice consists of introduction to basic knowledge of using manual hand tools and equipment, machine tools, welding, fabrication, lathe, milling, and some manual work within manufacturing daily activities. It introduces common equipments for performing manufacturing works such as lathe and milling machine, arc welding, tig/mig welding, sheet metal forming etc. Due to its nature as introductory course, students are required to prepare at home before having the practice to acquire any knowledge concerning the practices.

REFERENCES

1. Kalpakjian, S. and Schmid R. (2014), Manufacturing Engineering and Technology, 7th Edition, Prentice Hall.
2. Mikell P. Groover, Fundamentals of Modern Manufacturing Materials, Processes, and Systems, 4th Edition, John Wiley & Sons, 2010.
3. Mikell P. Groover, Principles of Modern Manufacturing SI Version, 5th Edition, John Wiley & Sons, 2013.

BMKH 1413
FUNDAMENTAL OF HVAC ELECTRIC & ELECTRONIC/
ASAS ELEKTRIK & ELEKTRONIK HVAC

LEARNING OUTCOMES

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

1. Explain the basic electrical and electronic principles, circuit schematic components relate to HVAC system.
2. Develop electrical circuits and justify measured values using appropriate approach for HVAC system.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

This course provides students with a fundamental understanding of electrical, electronic which directly related to HVAC system and components.

REFERENCES

1. Allan.R.Hambley, 2014, Electrical Engineering Principles and Applications, Pearson Education.
2. Thomas. E.Kissell, 2019, Electricity, Electronics, and Control Systems for HVAC, Pearson Education. Thomas.
3. L.Floyd, 2015, Digital Fundamental, 11th Edition, Pearson Education.
4. Nilsson, J. W. and Riedel, S. A., 2015, Electric Circuit, 10th Edition, Edinburg Gate Pearson Education Limit.
5. Ray C.Mullin and Phil Simmons, 2015, Electrical Wiring Residential, 18th Edition, Cengage Learning.

BMKT 2433
ENGINEERING DESIGN/
REKA BENTUK KEJURUTERAAN

LEARNING OUTCOMES

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

1. Categorize the methods and design concepts used in the engineering design process.
2. Composes a working design prototype to meet specified needs with appropriate consideration on the learned methods in the engineering process.
3. Develop an awareness of project management in the engineering design process.

SYNOPSIS

The methodology of design solutions and best practices in product design. Latest product development: the determination of market needs, determination design specifications, engineering concept generation, concept selection, detailed product specification, functional analysis, material selection. Innovative solutions. Creativity in the industry design, design visualization and anthropometric. Portfolio preparation and presentation.

REFERENCES

1. Rudolph J Eggert, Second Edition 2010. Engineering Design. Pearson Prentice Hall.
2. Ulrich, K. T. and Eppinger, S. D. 2015. Product Design and Development.
3. Mcgraw-Hill Ullman, D.G. 2015.The Mechanical Design Process.
4. Mcgraw-Hill Education (Asia), Singapore. Cross, N., 2008. Engineering Design Methods: Strategies for Product Design, 4th Ed., John Wiley And Sons, West Sussex UK.

BMKT 2513
THERMODYNAMICS/
TERMODINAMIK

LEARNING OUTCOMES

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

1. Apply the basic concepts of thermodynamics, the First Law of Thermodynamics and the Second Law of Thermodynamics to closed and open systems.
2. Follow instructions in laboratory sheets when conducting thermodynamic experiments.
3. Complete individual or group assignments within the time given.

SYNOPSIS

This course covers the basic concepts and definitions of engineering thermodynamics, energy, work and heat, properties of pure substances (relationships of *P-v, T-v, P-T* and *T-s* diagrams), First Law of Thermodynamics, Second Law of thermodynamics and Entropy.

REFERENCES

1. S.C. Gupta,2008. Thermodynamics, 1st Ed, Pearson Education(Singapore) Pte. Ltd.
2. Cengel, Y. A. and Boles, M. A..2014. Thermodynamics: An Engineering Approach, 8th Ed, McGraw Hill. Singapore.
3. Sonntag, R.E., Borgnakke. C, Van. and Gordon J., 2008. Fundamentals of Thermodynamics, 7th Edition, John Wiley & Sons, Inc.New York.
4. Eastop, T. D., And Mcconkey, A., 2011, Applied Thermodynamics for Engineering Technologists, 5th Ed, Pearson & Prentice Hall. New York.

SEMESTER 3

BMKT 1723
COMPUTER PROGRAMMING /
PENGATURCARAAN KOMPUTER

LEARNING OUTCOMES

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

1. Produce computer programming code based on principles, structures and techniques in C++.
2. Construct programming language code by applying suitable C++ programming techniques to solve a given problem.
3. Work in group effectively while performing group assignment.

SYNOPSIS

Throughout the course, students will be introduced with basic principles of computers and software development methodology. The course also consists of basic programming principles such as syntax, semantic, compiling, and linking. Programming techniques using C++ such as data type and operator, selection, repetition, function, array, file, and pointer are learnt towards the end of this course.

REFERENCES

1. Abdul Kadir, (2016), C++ Programming A Practical Hands-on for self-learning, 1st Edition, Penerbit Universiti, Universiti Teknikal Malaysia Melaka.
2. Gaddis, T., (2018), Starting Out with C++: From Control Structures through Objects, 8th Edition, Global Edition, Pearson Education.
3. Daniel Liang, Y, (2013), Introduction to Programming with C++, 3rd Edition, Pearson Education.
4. Deitel, H.M. and Deitel, P.J., (2010), C++ How to Program,9th Edition, Pearson Education.
5. Nell, D., (2014), Programming and Problem Solving with C++: Comprehensive, 6th Edition, Jones & Bartlett Learning.

BMKT 2323
SOLID MECHANICS/
MEKANIK PEPEJAL

LEARNING OUTCOMES

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

1. Apply the knowledge and principles of mechanics of materials in engineering design.
2. Display appropriate experimental techniques in mechanics of material through laboratory experiments.
3. Demonstrate the ability to work and communicate effectively in engineering project using the principle of mechanics of material.

SYNOPSIS

The course contains topics of introduction, stress, strain, hooke's law, bending, mechanical properties, transformation of stress, axial load, transformation of strain torsion, beam bending, transverse shear, combined loadings, deflection of beams and shafts and Mohr's circle.

REFERENCES

1. Hibbeler R.C., 2013, Statics and Mechanics of Materials, 3rd SI Ed., Prentice Hall, New York.
2. Beer. F.P. Et Al. 2012. Mechanics Of Materials, 6th Edition in SI Units. Mcgraw-Hill.
3. Beer. F.P. Et Al. 2011. Statics and Mechanics of Materials, 1st Edition. Mcgraw-Hill.
4. Beer, F. P. And Johnston Jr., E. R. and Eisenberg, E. R., 2010, Vector Mechanics For Engineers - Statics, 9th Ed. in SI Units, Mcgraw Hill, New York.
5. Roy Craig Jr., 2011, Mechanics of Materials, 3rd Ed., John Wiley & Sons, New York.

PRE-REQUISITE

BMKT 1313
STATICS / STATIK

BMKT 2333
DYNAMICS & MECHANICS OF MACHINE/
DINAMIK & MEKANIK MESIN

LEARNING OUTCOMES

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

1. Describe the concept and principle of dynamics and mechanics of machine element.
2. Demonstrate the dynamics and mechanics of machine laboratory experiments.
3. Synthesize dynamics and mechanics of machine into engineering practices.

SYNOPSIS

Introduction to basic principles based on kinematic and kinetic dynamics. The concept of displacement, distance, velocity, speed and acceleration. Application of newton's second law. The principle of work and energy, impulse and momentum of particles and rigid bodies. Transmission system based on the friction of motion, such as belts, brakes and dibble. Based delivery systems such as chains and gear teeth. Gear system. Balancing the dynamic system that includes balancing the body rotating plane and a parallel plane. Balancing of reciprocating motion as the body line of engines, radial engines and enginev. Gyroscopic motion that includes a couple gyroscope. Gyro scope coupling effects. Simple harmonic motion and vibration consists of moving one degree of freedom. Free vibration. Damped free vibration. Forced damped vibration. Speed control of the cycle flywheel.

REFERENCES

1. Beer, F. P., Johnson, E.R., Clausen, W. E., (2013) Vector Mechanics For Engineers, Dynamics Si Units, 10th Edition. Mcgraw-Hill.
2. Hibbeler, R. C. (2013) Engineering Mechanics, Dynamics, 12th Edition. Prentice Hall.
3. Meriam, J. L. And Kraige, L. G. 2013. Engineering Mechanics, SI Version, 7th Edition. John Wiley.
4. Bedford, A. and Fowler, W. 2008. Engineering Mechanics: Dynamics (SI Units). 5th Edition.Prentice Hall.
5. Cleghorn, W. L., 2005, Mechanics of Machines, Oxford University Press.

PRE-REQUISITE

BMKT 1313
STATICS/ STATIK

BMKT 2423
MODELING AND COMPUTER ANALYSIS/
PERMODELAN DAN ANALISIS BERKOMPUTER

LEARNING OUTCOMES

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

1. Apply fundamental of engineering and technical drawing in mechanical design using advance CAD tools.
2. Conduct computer modelling, design and analysis using advanced CAD tools.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

This course will empower the students with fundamental knowledge and technical skills of 3d solid modelling skills using industry-proven 3d mechanical cad software. The students will learn about the different techniques for creating surface and solid models with emphasis on design intent. The course includes hands-on exercises and best practice methods for students to interpret common error messages during part, assembly and drafting stages.

REFERENCES

1. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. And Novak, J. E.,Lockhart S., 2016, Technical Drawing With Engineering Graphics, 15th Ed., Pearson & Prentice Hall, New Jersey.
2. Planchard, D. & M. Planchard, Engineering Design With Solidworks 2012, Schroff Development Corporation, 2012.
3. Kirstie Plantenberg (2011), Introduction To Catia V5 Release 19 (A Hands-On Tutorial Approach), Schroff Development.

PRE-REQUISITE

BMKT 1413
ENGINEERING GRAPHICS/
GRAFIK KEJURUTERAAN

BMKH 2123
HVAC DESIGN PROJECT/
PROJEK REKABENTUK HVAC

SEMESTER 4

LEARNING OUTCOMES

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

1. Define problem, objective and HVAC design project life cycle.
2. Developing the HVAC project come with challenges and risks using appropriate tools.
3. Demonstrate the project management skills and show ability to work effectively as individuals, members or leaders in project teams.

SYNOPSIS

This course provides students the step in the HVAC design project development with consideration use of a large air conditioning system are the design, construction, commissioning, operation, energy efficiency upgrading and maintenance.

REFERENCES

1. Roger Legg, 2017, Air Conditioning System Design, B-H.
2. Engineering Design A Project-Based Introduction- Clive L. Dym, Wiley [4th Edition 2013].
3. Product Design and Development- Karl Ulrich, McGraw-Hill, [6th Edition, 2015].
4. Project Management For Engineering, Business, and Technology-J.M.Nicholas, Routledge, [4th Edition, 2011]

BMKT 2523
FLUID MECHANICS/
MEKANIK BENDALIR

LEARNING OUTCOMES

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

1. Apply fluid mechanics concept in solving fluid statics and fluid dynamics problem.
2. Measure related parameter by using appropriate techniques in fluid mechanics application.
3. Demonstrate the ability to complete tasks an assignment as a leader or a member in group effectively.

SYNOPSIS

Introduction to this course is about the basic physical properties of fluids. Then it covers the definition of pressure and head. Next it followed by derivation of hydrostatic equation and its application in pressure measurement, static forces analysis on immersed surface and buoyancy analysis. For fluid dynamics, it started with introduction to fluid dynamics and fluid flow analysis. Then it is continued by derivation of flow equations, the application of energy equation and Bernoulli equation in the calculation of flow velocity, discharge, and head lost in piping systems. The last topic for this course is dimensional analysis and its application.

REFERENCES

1. Munson, B. R., Young D. F. and Okiishi, T. H., 2012, Fundamentals of Fluid Mechanics, 7th Ed., John Wiley & Sons, Inc, Asia.
2. Som, S. K. and Biswas, G., 2010, Introduction to Fluid Mechanics and Fluid Machines, Revised 2nd Ed., Tata McGraw-Hill, New Delhi.
3. Douglas, J. F., Gasiorek J. M. and Swaffield, J. A., 2011, Fluid Mechanics, 6th Ed., Prentice Hall, Spain.
4. Kundu, P. K., Cohen, I. M. and Dowling, D. R., 2011, Fluid Mechanics, 5th Ed., Academic Press, Waltham, USA.

BMKT 3533
HEAT TRANSFER/
PEMINDAHAN HABA

LEARNING OUTCOMES

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

1. Solve analytically and numerically problems related to performance evaluation and design of heat transfer equipment's
2. Assemble laboratory equipment's according to the parameters investigated when conducting heat transfer equipment's.
3. Complete individual or group assignments within the time given.

SYNOPSIS

The introduction of the concept and definition of heat transfer engineering, energy, work, material thermal properties, mass transfer, the laws of the theory, empirical and analytical relationships. Numerical rules. Unsteady state conduction. Numerical analysis. Heat Transfer Simulation solution. Natural convection. Forced convection in laminar and turbulent flow in the plane and pipes. Phase change heat transfer. Thermal radiation on the body and a black surface. Low rate of heat transfer. Evaporation and condensation.

REFERENCES

1. Holman, J.P (2001). Heat Transfer. 8th SI Edition. McGraw Hill: Singapore.
2. Incopera, F.P. & Dewitt, D.P. (2002). Fundamental of Heat and Mass Transfer. 4th Edition, John Wiley and Sons: Toronto.
3. Cengel, Yunus A. (2003). Heat transfer: A Practical Approach. 2nd Edition, McGraw Hill: New York.

BMKH 2113
FUNDAMENTAL OF HVAC AND REFRIGERATION/
ASAS HVAC & PENYEJUKAN

LEARNING OUTCOMES

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

1. Manipulate the principle of vapour compression refrigeration cycle for air-conditioning.
2. Perform experiment on vapour compression cycle application.
3. Justify the important of recovering of recycling used refrigerants to prevent environmental damage.

SYNOPSIS

This course cover fundamental of air conditioning system including psychometric chart, carnot cycle and thermodynamics properties. The application of this course limited to small capacity air conditioning system such as split unit, window unit and variable refrigerant flow (VRF).

REFERENCES

1. Mcquiston. F. C. and Parker J. D. 1982. Heating Ventilation and Air Conditioning: Analysis and Design. 2nd Ed. New York: John Wiley.
2. Yunus A.C. & Michael A.Boles. 1994. Thermodynamic An Engineering Approach. 2nd Ed. Singapore: Mc Graw Hill Inc.
3. Jones W.P. 1980. Air Conditioning Applications and Design. New York: Edward Arnold (Publisher) Ltd.
4. Jones W.P. 1985. Air Conditioning Engineering. New York: Edward Arnold (Publisher) Ltd.
5. Johnson W.M. 1997. Practical Cooling Technology. New York: Delmar Publisher USA

SEMESTER 5

BMKT 3743
CONTROL & INSTRUMENTATION/
KAWALAN & INSTRUMENTASI

LEARNING OUTCOMES

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

1. Explain the dynamic behavior of the system through analysis of the system response.
2. Display the concept of controller and sensor elements/ transducer through learning and application of the device behaviour3.
   Explain effectively either individual or in group for any assignment and experiment.

SYNOPSIS

At first, this course shall discuss the concept of instrumentation, the important of sensor, signal conditioning and data acquisition. Then it shall discuss the fundamental of control system; open and closed loop system; transfer function; block diagram reduction and signal flow graphs; modelling for electrical system, mechanical system and electromechanical system; transient and steady-state performance for first and second order systems; routh hurwitz criteria for stability and steady-state error analysis.

REFERENCES

1. Syed Najib and Maslan, 2nd Control Systems Engineering, Penerbit Utem, 2006.
2. Khalil Azha Mohd Annuar Et. Al., Control & Instrumentation, Penerbit Utem, 2015.
3. Alan S. Moris and Reza Langari, Measurement and Instrumentation: Theory and Application, Academic Press, 2011.
4. Norman S. Nise, Control Systems Engineering, 6th Edition, John Wiley & Sons Inc., 2011.
5. Richard C. Dort, Robert H. Bishop, Modern Control Systems, 12th Edition, Pearson, 2011.

BMKH 3133
REFRIGERATION SYSTEM DESIGN/
REKABENTUK SISTEM PENYEJUKAN

LEARNING OUTCOMES

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

1. To practice safety in potentially harmful situation
2. To develop the skills and knowledge required for the installation and maintenance of industrial and maintenance of industrial refrigeration systems with respect to various codes and standards.
3. To develop an appreciation for conservation and environmental issue.

SYNOPSIS

This course in refrigeration systems requires the use of tools and equipment, measuring instruments and materials and supplies. It involves sizing, installing, troubleshooting and repairing industrial refrigeration systems. It includes information on types and operation of industrial refrigeration systems and component parts.

REFERENCES

1. Rodolfo H.Mascheroni (2016) Operations in Food Refrigeration: ISBN 9781138198920
2. Andrew D Althouse (2016) Modern Refrigeration and Air Conditioning: ISBN 13 9781631263545
3. Stephen L.Herman (2013) Electricity and Controls for HVAC-R: ISBN 13 9781133278207
4. Russell E.Smith (2014) Electricity for Refrigeration, Heating and Air Conditioning: ISBN 13 97811337399128
5. A C Bryant (1997) Refrigeration Equipment: ISBN 9780750636889
6. Wilbert F.Stoeker (1998) Industrial Refrigeration Handbook: ISBN 13 9780070616233

BMKH 3153
HEATING & COOLING LOAD/
BEBAN PEMANASAN & PENYEJUKAN

LEARNING OUTCOMES

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

1. Differentiate Cooling and Heating Loss calculation procedure using Manual calculation and CHVAC Software.
2. Design residential and commercial building with different building characteristics of Thermal Material, Air Infiltration and Ventilation effects using CLTD Method.
3. Function effectively as members or leaders in order to complete the project goal.

SYNOPSIS

The burden of cooling and heating can take place using various means of conduction, convection and radiation. Other factors such as weather, the nature of the materials used and the ventilation system also plays a role in cooling and heating load calculations.

REFERENCES

1. ASHRAE Press, 2007, Air Conditioning System Design Manual, 2nd Edition, Butterworth-Heinneman.
2. Jan, F.K., Peter S.C., and Ari R., 2009, Heating and Cooling of Buildings: Design for Efficiency, 2nd Edition, CRC Press.
3. McQuiston F.C., Jerald D.P., and Jeffrey D.S., 2004, Heating, Ventilating and Air Conditioning Analysis & Design, 6th Edition, Wiley.
4. Howard D.G. and Esko T., 2001, Industrial Ventilation Design Handbook, 1st Edition, Academic Press.
5. Thomas E.M., 1997, HVAC Principles and Applications Manual, 1st Edition, McGraw Hill Professional.

BMKH 3433
HVAC APPLIED ACOUSTIC & VIBRATION/
AKUSTIK & GETARAN GUNAAN HVAC

LEARNING OUTCOMES

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

1. Design the acoustics and vibration control system for air conditioning and cooling system.
2. Measure accurately the acoustics and vibration level of HVAC machinery and construct the control system.
3. Initiate the society awareness of the impact of acoustics and vibration of HVAC on the human health and safety.

SYNOPSIS

Explain the general picture of acoustic design in delivering the basic understanding about sound and vibration, their relationship with the cooling and air conditioning system, topics covers terminology, acoustic position, designing criteria, equipment selection/ guidelines application. Solving the noise problems.

REFERENCES

1. Frank Fahy, David Thompson, Fundamentals of Sound and Vibration, 2nd Edition, Crc Press, 2015.
2. Michael Norton, Denis, Karczub, Fundamentals of Noise and Vibration Analysis for Engineers, 2nd Edition, Cambridge, 2003.
3. Osama A. B. Hassan, Building Acoustic and Vibration, Theory and Practice, World Scientific, 2009.
4. Jens Blauert, Ning Xiang, Acoustics for Engineers, Spinger, 2009.
5. Robert D. Finch, Introduction to Acoustics, Prentice Hall, 2008.

SEMESTER 6

BMKH 3213
INDOOR AIR QUALITY/
KUALITI UDARA DALAMAN

LEARNING OUTCOMES

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

1. Identify indoor air quality (IAQ) problems using appropriate techniques and sampling strategy.
2. Demonstrates IAQ report based on IAQ assessment in appropriate manner.
3. Conduct IAQ problems maintenance procedure effectively with planning among team members.

SYNOPSIS

The course provides students with a dynamic understanding of indoor air quality and the effects of health, comfort and productivity. Student will learn about IAQ regulations ASHRAE guidelines, common indoor air quality problems and solutions, indoor air quality assessment of commercial buildings and how to achieve effective air quality in the workplace for optimum working conditions.

REFERENCES

1. Dudzinska, Marzenna R Management (2011) Management of indoor air quality, Boca Raton:CRC Press, ISBN: 9780415672665 (TD883.17.M36 2011 1000299272)
2. Robert Jennings Heinsohn John M.Cimbala (2013), Environment health: indoor air quality Point Pleasant, NJ: AppleAcademic Press, Inc, ISBN: 9781926895208 (TD883.17.E58 2013 1000301221)
3. Hess-Kosa, K. (2016). Indoor air quality: the latest sampling and analytical methods. CRC Press.
4. Haines, R. W., & Myers, M. E. (2010). HVAC systems design handbook. McGraw-Hill.
5. Enteria, N., Awbi, H., & Yoshino, H. (Eds.). (2017). Desiccant Heating, Ventilating, and Air-Conditioning Systems. Springer Singapore.

BMKH 3163
AIR DISTRIBUTION SYSTEM/
SISTEM PENGAGIHAN UDARA

LEARNING OUTCOMES

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

1. Explain the terminology of air ducting system and ventilation system.
2. Construct ducting layout according to cods and standard of building and HVAC.
3. Demonstrate and understanding of air ducting system towards health, safety and legal awareness.

SYNOPSIS

Introduction to the definition and airway terminology, channel design, channel measurement method with Aspect Ratio and Ductulator, Diffuser selection and grilles, material and coating material for the channel HVAC industry, the preparation of Single Line Diagram (SLD) and the layout, and concept of CAV and VAV

REFERENCES

1. S. Don Swenson, HVAC – Heating, Ventilating, and Air Conditioning, ATP.
2. Thomas E. Mull, Hvac- Priniciples and Apploications Manual.
3. Awbi H.B., 2000, Air Distributions in Rooms, 1st Edition, Elsevier Science.
4. Naima, 1997, A Guide to Insulated Air Duct Systems.
5. Lama, Airflow in Ducts, Lama Book.

BMKH 3224
TRANSPORTATION AIR-CONDITIONING & REFRIGERATION/ PENYEJUKAN & PENYAMAN UDARA KENDERAAN

LEARNING OUTCOMES

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

1. Identify in depth problem based on concept, components and design of vehicle air conditioning system.
2. Demonstrate vehicle air conditioning system experiment and report the result in appropriate manner.
3. Function effectively as members or group leader in achieving Transportation Air Conditioning System project goal.

SYNOPSIS

Detailed explanation of the reality of vehicle cooling systems in learning to adapt to various cooling systems.

REFERENCES

1. Automotive Heating and Air Conditioning, 6th Edition, Classroom Manual, Mark Schnubel, 2017.
2. ASHRAE Handbook, Fundamental 2017.
3. Automotive Service, Inspection, Maintenance, Repair, 5th Edition, Tim Gilles, 2016.
4. Thomas S.B., 2009, Automotive Heating & Air Conditioning, 5th Edition, Prentice Hall.
5. John H., 2000, Haynes Automotive Heating and Air Conditioning Systems Manual, 3rd Edition, Haynes Manuals Inc.
6. Boyce D., 2001, Automotive Air Conditioning, 8th Edition, Delmar Cengage Learning.
7. James H., 2005, Marine Refrigeration and Air Conditioning, Cornell Maritime Press.
8. John V.A., And Milton R., 1991, Auto Air Conditioning Technology, Goodheart-Wilcox Publisher.

BMKH 3423
HVAC ELECTRICAL & CONTROL SYSTEM/ SISTEM ELEKTRIK & KAWALAN HVAC

LEARNING OUTCOMES

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

1. Explain electrical operation used in HVACR system.
2. Construct electrical circuit for HVACR system to optimize operation parameters by using the chosen control method.
3. Demonstrate an understanding of the impact of engineering practices towards thermal comfort, air quality and effectiveness of energy consumption.

SYNOPSIS

Introduction to electricity in the HVAC system. Electrical components and measurement equipment. Analysis in the heat pump circuit. Phases and complex numbers, filters, transformers.

REFERENCES

1. Dale R. Patrick, Stephen W. Fardo, Electrical Distibution System, 2nd Ed. The Fairmont Press, Inc
2. Steven J. Marrano, Craig DiLouie, The Electrical System Design & Specification Handbook for Industrial Facilities, The Fairmont Press, Inc
3. Robert McDowall, 2008, Fundamentals of HVAC Control System, Elsevier
4. Roger W. and Douglas C., 2006, Control Systems for Heating, Ventilating and Air Conditioning, Birkhäuser.
5. Thomas E.K., 2007, Electricity, Electronics and Control System for HVAC, 4th Edition, Prentice Hall.

PRE-REQUISITE

BMKH 1413
FUNDAMENTAL OF HVAC ELECTRIC & ELECTRONIC/ ASAS ELEKTRIK & ELEKTRONIK HVAC

BMKT 3214
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA I

LEARNING OUTCOMES

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

1. Apply Knowledge to proposal preparation of industry-based or practice- priented project.
2. Imitate appropriate existing concepts in engineering technology fields.
3. Adhere to project's dateline and related procedure.
4. Explain the project proposal in oral and written forms effectively.
5. Report literature review and preliminary findings in a scientific manner

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan, Universiti Teknikal Malaysia Melaka.

SEMESTER 7

BMKT 4224
BACHELOR DEGREE PROJECT II/
PROJEK SARJANA MUDA II

LEARNING OUTCOMES

After completing the course, students will be able to:

1. Discuss solution to the proposed industry-based or practice-oriented project.
2. Demonstrate project findings using appropriate techniques with an understanding of its limitations.
3. Display self-reliance in working independently and cooperates in group activities.
4. Display the ability to present the project findings in oral and written forms effectively.
5. Report literature review and project potential in scientific manner with a recognition of the strengths, weaknesses and opportunity for improvement.

SYNOPSIS

This is the second part of the Bachelor Degree Project. Students are expected to continue the project done in Bachelor degree Project Part 1 till completion. At the end of the semester students are required to submit the Bachelor Degree Project report both orally and in writing for assessment.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE

BMKT 3214
BACHELOR DEGREE PROJECT I/
PROJECT SARJANA MUDA I

BMKH 4143
CLASSIFICATION OF AIR CONDITIONING SYSTEM/
KLASIFIKASI SISTEM PENYAMAN UDARA

LEARNING OUTCOMES

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

1. Differentiate type of HVAC system and operation.
2. Demonstrate the operation of different type of HVAC system.
3. Demonstrate an understanding of the impact of HVAC system towards health and energy effectiveness.

SYNOPSIS

A lesson on concept classification of air conditional system. Topics cover in this course are selection criteria for air conditioning systems, classification of air conditioning systems according to substance used.

REFERENCES

1. McQuiston and Parker, 1998, Heating, Ventilation and Air Conditioning Analysis and Design, 3rd Edition, Wiley.
2. Edward G Pita, 2000, Air Conditioning Principles and System: An Energy Approach, 4th Edition, John Wiley.
3. Jan F. Kreider and Ari Rabl, 1987, Heating and Cooling of Buildings: Design for Efficiency, McGraw Hill.
4. ASHRAE Handbooks Volume 1,2,3 & 4.

BMKH 4233
MAINTENANCE OF HVAC SYSTEM/
PENYELENGGARAAN SISTEM HVAC

LEARNING OUTCOMES

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

1. Evaluate the performance of any HVAC System and construct maintenance instruction to solve any HVAC problem.
2. Demonstrate maintenance procedure and management of maintenance system.
3. Complete maintenance procedures effectively with planning among team members.

SYNOPSIS

HVAC environment, average temperature. Energy economics: units, degree-days, thermal fluidity. Heat loss calculation, heat absorption pump, and heater storage. Ventilation and air-conditioning: sensible heat, mechanical ventilation. Hot water and cold-water storage.

REFERENCES

1. Robert C. Rosaler, 1998, HVAC Maintenance and Operation Handbook, McGraw-Hill Professional.
2. David W. Bearg, 1993, Indoor Air Quality and HVAC System, Lewis Publishers.
3. Guy W. Gupton, 2002, HVAC Control: Operation and Maintenance, the Fairmont Press, Inc.
4. Samuel C. Sugarman, 2005, HVAC Fundamentals, the Fairmont Press, Inc.
5. Samuel C.S., Samuel C.M., 1992, HVAC System: Operations, Maintenance and Optimization, 1st Edition, Prentice Hall.

BMKH 4243
HVAC GREEN TECHNOLOGY/
TEKNOLOGI HIJAU HVAC

LEARNING OUTCOMES

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

1. Discover current problem in HVAC components/ system in order to develop new "Green HVAC" concepts.
2. Perform calculation of energy saving from "Green HVAC" system as compared to conventional system and manipulate benefits of renewable energy sources.
3. Build awareness of necessity of "Green HVAC" invention and its impact on indoor air quality and carbon.

SYNOPSIS

"Green HVAC" Is defined as a good air quality which reduce pollution on environment such as global warming and also cost effective.

REFERENCES

1. David J. And Kim M., 2004, Green Remodeling: Changing the World One Room at A Time, New Society Publishers.
2. American Society of Heating, Refrigeration and Air Conditioning Engineers, 2006, ASHRAE Green Guide: The Design, Construction, and Operation of Sustainable Buildings, 2nd Ed, Butterworth-Heinemann.
3. HVAC Excellence and Ferris State University, 2008, Green Mechanical System, 1st Edition, Esco Press.
4. Jayamaha L., 2006, Energy Efficient Building Systems: Green Strategies for Operations and Maintenance, 1st Edition, McGraw Hill Professional.
5. ASHRAE Press, 2007, Air Conditioning System Design Manual, 2nd Edition, Butterworth-Heinneman.

BMKH 4173
HVAC MODELING & ANALYSIS/
PERMODELAN & ANALISIS HVAC

LEARNING OUTCOMES

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

1. Understand the operation, advantages and limitation of HVAC software.
2. Construct piping and ducting layout of HVAC System using software.
3. Able to accommodate with each other in resolving conflicts, different value and characteristics in achieving goal.

SYNOPSIS

HVAC software is related to the software psychometric, sizing piping and others. Introduction to computer-aided fluid dynamics (Computational Fluid Dynamics, CFD). Law of conservation of fluid flow and boundary conditions. Finite volume methods for diffusion problems. Finite volume methods for diffusion-flow problems. Solution algorithm for pressure-velocity relationship for steady flow. Solution to discredited equation. Finite volume method for unsteady flow. The use and role of the boundary method.

REFERENCES

1. Peerless HVAC (C-20) Software Only, 2009.
2. Versteeg, H.K. and Malalasekera, W., 2007, An Introduction to Computational Fluid Dynamics: The Finite Volume Method, 2nd Ed, Pearson Education Limited, Great Britain.
3. Anderson, J.D.A, 1995, Computational Fluid Dynamics, McGraw Hill Books Company, New York.
4. Tannehill, J., 1997, Computational Fluid Dynamics and Heat Transfer, 2nd Ed, Taylor and Francis.
5. Date, A.W., 2005, Introduction to Computational Fluid Dynamics, Cambridge University Press.

BMKM 4243
INSTRUMENT CALIBRATION/
PENENTUKURAN INSTRUMEN

LEARNING OUTCOMES

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

1. Determine the importance of calibration and common calibration procedure for industrial instruments.
2. Perform industrial instrument calibration using acceptable international standard.
3. Discuss the calibration procedure with the team and report the calibration result.

SYNOPSIS

Introduction to calibration where students are exposed to the importance of gather precise and consistent data from test equipment. Students also been teaching on how to maintained high quality calibration system.

REFERENCES

1. Richard S. Figliola & Donald E. Beasley, Theory and Design for Mechanical Measurements, 6th Ed. John Wiley & Sons, Inc, 2014.
2. N.V. Ragavendra & L. Krishnamurthy, Engineering Metrology & Measurements, Oxford University Press, 2013.

BMKH 4313
PROJECT MANAGEMENT/
PENGURUSAN PROJEK

LEARNING OUTCOMES

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

1. Apply the core concepts and principles, functions, and process in project management.
2. Justify the important skills required and the necessary implementation methodology/ formulation in project management.
3. Develop a comprehensive & viable Project Proposal a deliver a presentation of the proposal.

SYNOPSIS

This course focuses on the principles of project management including the importance and interrelationship of all its components. Students will be familiarized with the Project Management process group functions (initiating, planning, executing, controlling and closing) and project knowledge areas (integration, scope, time, cost, quality, human resources, communications, risks and procurement). Various tools for supporting the analysis of works in engineering project management will be introduced. Topics including initiating and planning the project, working with the management, project appraisal & sensitivity, creating budget and work breakdown structure, managing uncertainty & risk, building project plan, implementing and revising project plan, completing the project and contract laws.

REFERENCES

1. Meredith, Mantel, Shafer and Sutton (2014). Core Concepts: Project Management in practice, 5th Edition, John Wiley & Sons.
2. Pinto, K. Jeffrey. (2016). Project Management, Achieving Competitive Advantage, 4th Edition. Pennsylvania State University, Prentice Hall.
3. Rosenau, M. (2005). Successful Project Management, 3 Ed., John Wiley & Sons.
4. Meredith, J., Mantel, S. and Mantel, S. Jr. (2009). Project Management: A Managerial Approach. New York, John Wiley & Sons Inc.

BMKH 4323
LEAN MANUFACTURING/
PEMBUATAN KEJAT

LEARNING OUTCOMES

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

1. Describe the philosophy and foundation of industrial lean manufacturing.
2. Follow appropriate analytical technique to identify and eliminate the types of waste apparent in a HVAC industrial manufacturing system.
3. Propose industrial value stream mapping to appraise the current state.

SYNOPSIS

Lean Manufacturing is based upon the principle of eliminating waste at all levels throughout the manufacturing system. This module reviews the skills and techniques required to analyse manufacturing system and to design improved methods and layouts. It will use Value Stream Mapping to understand and appraise the current state; future state mapping will be used to develop and vision of value added flow. The focus of this module will be on the application of the technique through studies and industrial experience and will identify the benefits to be gained by their successful.

REFERENCES

1. Williams, M.F. (2000). Lean Manufacturing: Tools, Techniques, and How to Use Them. St.Lucie Press.
2. Tapping, D.,Luyster,T.and Shuker,T (2002). Value Stream Management. The Productivity Press.
3. Womack, J.P. and Jones, D.T.(1999). Lean Thinking. Simon & Schuster.
4. Shingo, S (1989). A Study of the Toyota Production System from an Industrial Engineering Viewpoint. Productivity Press
5. Womack, J. P., Jones, D. T. and Ross, D. (1995). The Machine that Change the World: the Story of Lean Production. Rawson Associates.

BMKH 4333
JIG AND FIXTURES/
JIG DAN LEKAPAN

LEARNING OUTCOMES

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

1. Show competencies in design requirements for jigs and fixtures.
2. Design and construct jigs and fixtures.
3. Prepare a technical document on jig and fixtures design.

SYNOPSIS

This course starts with an introduction of jigs and fixtures that is used to facilitate production works, making interchangeable pieces of work possible to save production cost. Jigs and fixture are used to locate and hold the work that is to be machined. Also, the use of this device can result in such a degree of accuracy that workpieces can be assembled with a minimum amount of fitting. A jig and fixture can be designed for a particular job. The form to be used depends on the shape and requirement of the workpiece to be machined.

REFERENCES

1. E.G. Hoffman (2004) Jig and Fixture Design 5th edition, Thomson Delmar Learning Publisher.
2. E.K. Henriksen (1973) Jig and Fixture Design Manual, Industrial Press, New York.

BMKH 4343
INDUSTRIAL FORWARD PRACTICE/
PENGAMALAN INDUSTRI TERKEHADAPAN

LEARNING OUTCOME

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

1. Outline the various systems used in a manufacturing plant and their role in an Industry 4.0 world.
2. Demonstrate smartness in Smart Factories, smart products or smart services.
3. Present the power of Cloud Computing in a networked economy.

SYNOPSIS

The world is at the onset of the Fourth Industrial Revolution and this revolution is very much driven by the smarts in automating decision making and processes. Advancements in IT has resulted in immense improvements in computational power across nearly all electronic devices and enhanced capabilities in connecting the dots in an increasingly networked society. Digital platforms in the Cloud provides a perfect canvas for inventing new business models and for intelligent algorithms to analyse data and derive knowledge for operationalize use by cyber physical systems. This course provides a comprehensive coverage on, among others, the role of data, manufacturing systems, various Industry 4.0 technologies, applications and case studies. In particular, we also draw input from researchers and practitioners on what are the opportunities and challenges brought about by Industry 4.0, and how organisations and knowledge workers can be better prepared to reap the benefits of this latest revolution.

REFERENCES

1. Alp Ustundag & Emre Cevikcan (2018). Industry 4.0: Managing The Digital Transformation,1st Edition. Springer
2. Fran Yáñez (2017).The Goal is Industry 4.0: Technologies and Trends of the Fourth Industrial Revolution. Independently Published.
3. Alasdair Gilchrist. (2016). Industry 4.0: The Industrial Internet of Things, 1st Edition. Apress
4. Giacomo Veneri and Antonio Capasso (2018) .Hands-On Industrial Internet of Things: Create a powerful Industrial IoT infrastructure using Industry 4.0. Packt Publishing.

BMKH 4353
ENGINEERING FINANCIAL, COSTING AND ECONOMICS/
KEWANGAN. KOS DAN EKONOMI KEJURUTERAAN

LEARNING OUTCOMES

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

1. Describe the role of engineering financial, costing and economics.
2. Adapt the concepts, principle and techniques in engineering financial, costing and economics.
3. Identify cost effectiveness in engineering financial, costing and economics.

SYNOPSIS

The course covers engineering financial, cost and finance in making final decisions. Engineering financial is crucial as it can help to assess the financial state of business as well as to select the best decision making and also allocating capital. It also helps to understand the financial sensitivity of project decisions and the use of decision tools for integrating business requirements. Besides, cost management which consists of production cost relationship, elements of the production process, managerial and cost accounting, inventory management, cost estimating methodology and cost control alternatives will be discussed in details in this subject. Apart from that, engineering economics will discuss about the time value of money and interest relationship, which are useful to define certain project criteria that are utilized by engineers and project managers to select the best economic choice among several alternative. Projects examined will include both product and service producing investments. The effects of escalation, inflation and taxes on the economic analysis of alternative are also discussed. Management of risk incorporates the concepts of probability and statistics in the evaluation of alternative. The evaluation allows management to determine the probability of success of failure of the project.

REFERENCES
1. Blank, L and Tarquin, A. Engineering Economy,7th Edition, McGraw Hill, 2012
2. Whitman D. anf Terry R. (2012) Fundamentals of Engineering Economics and Decision Analysis Morgan& Claypool Publishers.
3. W.G Sullivan, E.M Wicks,C.P. Koelling "Engineering Economy". Prentic hall international 14th Ed, 2009
4. Hartman, Joseph c. (2006) Engineering Economy and the Decision making Process. Prentice Hall.

BMKH 4363
MANUFACTURING MANAGEMENT/
PENGURUSAN PEMBUATAN

LEARNING OUTCOMES

Upon completion of this course, student should be able to:
1. Describe the role of manufacturing management related to HVAC Industrial Engineering.
2. Demonstrate manufacturing operation scenarios using Industrial Engineering tools and techniques.
3. Prepare a technical document on related to topics HVAC Manufacturing Management.

SYNOPSIS

Students will be introduced to the concept of productivity and the various Industrial Engineering (IE) tools and techniques to improve productivity. Thus, during the first part of the course, emphasis will be on constructing activities on Forecasting, Work System Design, Strategic Capacity Planning, and Facility Layout in order to attain efficiency and effectiveness in manufacturing operations. In the second part, teaching and learning activities related to Material Requirement Planning, Inventory Control, Production Scheduling and Simulation Modelling. Lastly, the topic of Lean Manufacturing will also be included in order to introduce to the students on the recent focus by many companies to eliminate wastes in the operations

REFERENCES
1. Stevenson, W.J., Chuong, S.C (2010). Operations Management: An Asian Perspective, 11th Edition. McGraw Hill.
2. Garcia-Diaz, Alberto and Smith, J.MacGregor (2008). Facilities Planning & Design. Prentice Hall.
3. Arnold, J.R. Tony, Chapman, Stephen N. and Clive, Lloyd M. (2012). Introduction to Materials Management. Pearson International.
4. Garcia-Diaz, Alberto, and James MacGregor Smith. Facilities planning and design. Prentice Hall, 2008.

SEMESTER 8

BMKT 4236
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME

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

1. Build technical competencies and skills gained throughout their internship.
2. Prepare a report on the industrial field daily activities in the log book systematically.
3. Develop effectively with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS

All students are required to undergo industrial training as part of their curriculum to complete four (4) years program for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES

1. UTeM Guideline Handbook for Industrial Training.

BMKT 4246
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME

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

1. Produce industrial training report
2. Present report orally on working experience

SYNOPSIS

All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE

Student required to pass Industrial Training BMMU 4786 in order to pass Industrial training report.

REFERENCES

1. UTeM Guideline Handbook for Industrial Training.

BMKM COURSE CORE COURSES (K)

SEMESTER 1

BMKT 1413
ENGINEERING GRAPHICS/
GRAFIK KEJURUTERAAN

LEARNING OUTCOMES

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

1. Apply fundamental of technical drawing to produce standard mechanical part and assemblies drawing documents.
2. Construct typical mechanical engineering drawing using CAD software.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

The course concentrates on computer aided design (CAD) software. AutoCAD engineering drawing software is used to produce standard engineering drawing. The students will be exposed to cad interface, editing commands, coordinate system, template preparation and layer in order to produce various types of engineering drawings.

REFERENCES

1. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. and Novak, J. E.,Lockhart S., 2016, Technical Drawing With Engineering Graphics, 15th Ed., Pearson & Prentice Hall, New Jersey.
2. Mark Dix, Paul Riley, 2012, Discovering Autocad 2012, Prentice Hall, London.
3. Scott Onstott, 2011, Autocad 2012 And Autocad Lt 2012 Essential, John Wiley & Sons, Inc.
4. Cheryl R. Shrock And Steve Heather, 2015, Beginning Autocad 2015, Industrial Press, Inc.

BMKT 1613
ENGINEERING MATERIALS/
BAHAN KEJURUTERAAN

LEARNING OUTCOMES

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

1. Explain the structures, properties and processing of engineering materials.
2. Display the ability to determine the microstructures and mechanical properties of various materials.
3. Construct the solution for engineering material problems.

SYNOPSIS

This course introduces basic concepts of engineering materials that covers introduction to engineering materials, inter-atomic bonding, crystalline structure and imperfections in solid. Explanation on different type of engineering materials (i.e. metal, polymer, ceramic, composite and semiconductor), its mechanical properties, basic application and processing are also included. Introduction to the binary phase diagrams (composition and microstructure correlation) is also given.

REFERENCES

1. Callister W.D. and Rethwisch D.G, 2011, Fundamentals of Materials Science and Engineering, 8th Edition, John Wiley & Sons.
2. Smith W. F., 2011, Foundation of Materials Science and Engineering, 5th Edition, Mcgraw Hill.
3. Askeland D. R., 2011, The Science and Engineering of Materials, 6th Edition, Cl-Engineering.
4. Serah, A. M., 2017, Engineering Materials for Engineering Technologist. Melaka: Universiti Teknikal Malaysia Melaka.

BMKT 2643
MANUFACTURING PR0CESS/
PROSES PEMBUATAN

LEARNING OUTCOMES

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

1. Explain the fundamental concepts of manufacturing processes.
2. Display the application of various manufacturing processes.
3. Construct various skills of manufacturing techniques as an individual or a group.

SYNOPSIS

This course introduces the students to manufacturing and the aspects of manufacturing, metal-casting processes and equipment's, forming and shaping processes and equipment's, joining processes, manufacturing materials, and material-removal processes and machines.

REFERENCES

1. S. Kalpakjian, S.R. Schmid, 2014. Manufacturing Engineering and Technology SI Edition, Prentice Hall.
2. M.P. Groover, 2010. Fundamentals of Modern Manufacturing. Materials, Processes and Systems 4th Edition, John Wiley & Sons, Inc.
3. M. P. Groover, 2012. Introduction To Manufacturing Processes, 3rd Edition, Hoboken, NJ: Wiley.
4. P. N. Rao, 2009. Manufacturing Technology Foundry, Forming and Welding, 1st Edition, Mc Graw Hill.
5. P. N. Rao, 2009. Manufacturing Technology Metal Cutting and Machine Tools, 2nd Edition, Mc Graw Hill.
6. Amitabha Ghosh, Asok Kumar Mallik, 2009. Manufacturing Science, EWP New Dehli.

BMKT 2633
MEASUREMENT AND INSTRUMENTATION/
PENGUKURAN DAN INSTRUMENTASI

LEARNING OUTCOMES

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

1. Analyse the basic elements of common measurement systems.
2. Perform suitable measurement methods for a given issue.
3. Measure the performance of a measurement system.

SYNOPSIS

Measurement and instrumentation course covers three main areas; dimensional metrology, measurement analysis, and surface/texture measurement. In the dimensional metrology, students will be expose to three types of measurements; linear, angle and geometrical. Besides that, measurement of screw thread also covered in this course. Students will be taught from basic measuring instruments and will be introduced to the usage of the high precision measuring instruments that are Coordinate Measuring Machine and CNC Roundness measuring. In the measurements analysis, students will be required to describe the standard Measurement, measurement process, process capability, measurement errors, limits, tolerances and fits. In surface/texture measurement, students will perform the measurement of surface texture.

REFERENCES

1. Lau Kok Tee, and Saiful Naim Sulaiman (2020) Dimensional Measurement and Instrumentation for Technologist, Penerbit Universiti, Universiti Teknikal Malaysia Melaka
2. Connie, D. (2015). Fundamentals of Dimensional Metrology, 6th Edition. Cengage Learning.
3. Kalpakjian, S., Schimd, S. R., (2014). Manufacturing Engineering and Technology, 7th Edition. Prentice Hall.
4. Bucher, J. L. (2012). The Metrology Handbook, 2nd Edition. SQ Quality Press.

SEMESTER 2

BMKT 2423
MODELING AND COMPUTER ANALYSIS/
PERMODELAN DAN ANALISIS BERKOMPUTER

LEARNING OUTCOMES

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

1. Apply fundamental of engineering and technical drawing in mechanical design using advance CAD tools.
2. Conduct computer modelling, design and analysis using advanced CAD tools.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

This course will empower the students with fundamental knowledge and technical skills of 3D solid modelling skills using industry-proven 3D mechanical CAD software (SolidWork). The students will learn about the different techniques for creating surface and solid models with emphasis on design intent. The course includes hands- on exercises and best practice methods for students to interpret common error messages during part, assembly and drafting stages.

REFERENCES

1. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. And Novak, J. E.,Lockhart S., 2016, Technical Drawing With Engineering Graphics, 15th Ed., Pearson & Prentice Hall, New Jersey.
2. Planchard, D. & M. Planchard, Engineering Design With Solidworks 2012, Schroff Development Corporation.
3. Kirstie Plantenberg 2011, Introduction To Catia V5 Release 19 (A Hands-On Tutorial Approach), Schroff Development.

PRE-REQUISITE

BMKT 1413
ENGINEERING GRAPHICS/
GRAFIK KEJURUTERAAN

BMKT 1313
STATICS/
STATIK

LEARNING OUTCOMES

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

1. Describe the physical sciences of statics concepts.
2. Construct statics experiments to recognize the engineering mechanics of statics principles.
3. Explain effectively as an individual and assist group members for experimental and assignment works.

SYNOPSIS

An introduction to the basic concept of statics as physical sciences, system of units, scalars and vectors, free body diagram, forces system, force system resultants and moment, equilibrium of a particle, equilibrium of a rigid body, structural analysis (trusses analysis and simple frames and machines), friction and center of gravity and centroid.

REFERENCES

1. Hibbeler R.C., 2016, Engineering Mechanics Statics, 14th SI Ed., Prentice Hall, New York.
2. Beer, F. P. And Johnston Jr., E. R. And Eisenberg, E. R., 2016, Vector Mechanics for Engineers - Statics, 11th Ed. in SI Units, Mcgraw Hill, New York.
3. Meriam, J. L. and Kraige L. G., 2011, Engineering Mechanics Static SI Version, 7th Ed., John Wiley & Sons, New York.
4. Pytel and Kiusaalas. 2009. Engineering Mechanics-Static. 3rd Ed. Cengage Learning.
5. Michael P., Gary G.,F. Constanzo 2009. Engineering Mechanics- Statics. Mcgraw-Hill Higher Education.

BMKT 1713
PRINCIPLE OF ELECTRIC & ELECTRONIC/
PRINSIP ELEKTRIK & ELEKTRONIK

LEARNING OUTCOMES

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

1. Explain the basic of electrical and electronics principles, circuit schematics and components.
2. Develop electrical circuit and justify the measured values using appropriates approach.
3. Demonstrate ability to work effectively as individuals, members or leaders in technical teams.

SYNOPSIS

This course will cover on the topics of electrical and electronic components, emphasizing on electric circuit theory such as components and measurement instruments, circuit analysis. For electronic principle, it will cover on the topics of electronic devices such as operational amplifiers and digital electronics it will deals with topics such as system numbers, logic gates, boolean operation, combination logic circuits, and digital circuit application.

REFERENCES

1. Thomas L. Floyd, 2010, Principles Of Electric Circuits, 9th Ed., Prentice Hall.
2. Thomas L.Floyd, 2009, Digital Fundamental, 10th Ed., Pearson Education.
3. Alexander, C.K., 2008, Fundamental Of Electric Circuit, Mcgraw Hill.
4. Nilsson, J. W. and Riedel, S. A., 2008, Electric Circuit, Prentice Hall.
5. Roger Tohkeim, 2008, Digital Electronics Principles & Applications, Mcgraw Hill.

BMKT 2513
THERMODYNAMICS/
TERMODINAMIK

LEARNING OUTCOMES

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

1. Apply the basic concepts of thermodynamics, the First Law of Thermodynamics and the Second Law of Thermodynamics to closed and open systems.
2. Follow instructions in laboratory sheets when conducting thermodynamic experiments.
3. Complete individual or group assignments within the time given.

SYNOPSIS

This course covers the basic concepts and definitions of engineering thermodynamics, energy, work and heat, properties of pure substances (relationships of *P-v, T-v, P-T* and *T-s* diagrams), First Law of Thermodynamics, Second Law of thermodynamics and Entropy.

REFERENCES

1. Cengel, Y. A. and Boles, M. A..2014. Thermodynamics: An Engineering Approach, 8th Ed, McGraw Hill. Singapore.
2. S.C. Gupta,2008. Thermodynamics, 1st Ed, Pearson Education(Singapore) Pte. Ltd.
3. Sonntag, R.E., Borgnakke. C, Van. and Gordon J., 2008. Fundamentals of Thermodynamics, 7th Edition, John Wiley & Sons, Inc.New York.
4. Eastop, T. D., And Mcconkey, A., 2011, Applied Thermodynamics for Engineering Technologists, 5th Ed, Pearson & Prentice Hall. New York.

SEMESTER 3

BMKT 2333
DYNAMICS & MECHANICS OF MACHINE/
DINAMIK & MEKANIK MESIN

LEARNING OUTCOMES

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

1. Describe the concept and principle of dynamics and mechanics of machine element.
2. Demonstrate the dynamics and mechanics of machine laboratory experiments.
3. Synthesize dynamics and mechanics of machine fundamentals into engineering practices.

SYNOPSIS

Introduction to basic principles based on kinematic and kinetic dynamics. The concept of displacement, distance, velocity, speed and acceleration. Application of newton's second law. The principle of work and energy, impulse and momentum of particles and rigid bodies. Transmission system based on the friction of motion, such as belts, brakes and dibble. Based delivery systems such as chains and gear teeth. Gear system. Balancing the dynamic system that includes balancing the body rotating plane and a parallel plane. Balancing of reciprocating motion as the body line of engines, radial engines and v-engine. Gyroscopic motion that includes a couple gyroscope. Gyro scope coupling effects. Simple harmonic motion and vibration consists of moving one degree of freedom. Free vibration. Damped free vibration. Forced damped vibration. Speed control of the cycle flywheel.

REFERENCES

1. Beer, F. P., Johnson, E.R., Clausen, W. E., 2013. Vector Mechanics For Engineers, Dynamics Si Units, 10th Edition. Mcgraw-Hill.
2. Hibbeler, R. C. 2013. Engineering Mechanics, Dynamics, 12th Edition. Prentice Hall.
3. Meriam, J. L. And Kraige, L. G. 2013. Engineering Mechanics, SI Version, 7th Edition. John Wiley.
4. Bedford, A. and Fowler, W. 2008. Engineering Mechanics: Dynamics (SI Units). 5th Edition.Prentice Hall.
5. Cleghorn, W. L., 2005. Mechanics of Machines, Oxford University Press.

PRE-REQUISITE

BMKT 1313
STATICS/ STATIK

BMKT 3543
PNEUMATIC AND HYDRAULIC TECHNOLOGY/
TEKNOLOGI HIDRAULIK DAN PNEUMATIK

LEARNING OUTCOMES

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

1. Apply knowledge of engineering fundamentals in order to analyse performance of hydraulic and pneumatic system
2. Construct hydraulic and pneumatic system manually and using software.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams

SYNOPSIS

This course covers the introduction of the hydraulic and pneumatic systems, types of pump, compressor and their working principles, types of valve, actuator and their usage, performance of the fluid power system, others fluid power system ancillaries and sensors, fluid power system circuit design and analysis with manual control and electrical control, fluid power symbols, the usage of computer software to design and simulate the fluid power system circuit, the usage of programmable logic controller in fluid power system circuit design and the application of fluid power in robotic and mobile hydraulic.

REFERENCES

1. Ilango S. 2011. Introduction to Hydraulics and Pneumatics. Prentice Hall-India. New Delhi.
2. Esposito A. 2013. Fluid Power with Applications .7th Ed. Pearson New International Edition.
3. Ilango, S. and Soundararajan, V. 2011 Introduction to Hydraulics and Pneumatics. 2nd. Ed. Prentice Hall-India, New Delhi
4. Robert H. Bishop 2017. The Mechatronics Handbook 2nd Ed. CRC Press, London

BMKM 2223
MACHINE TOOL TECHNOLOGY/
TEKNOLOGI PERKAKASAN MESIN

LEARNING OUTCOMES

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

1. Determine the machining parameter to produce a product.
2. Construct a logical sequence in maintaining the tool & die components to its specification.
3. Demonstrate good work and safety habits, while using hand tools and power equipment.

SYNOPSIS

This course introduces the basic principles and methods of machine tools technology. The course introduces students to the safety, job planning, measurements, layout tools and procedure involving machine tools. This course emphasizes the applications towards machining criteria such as cutting speed, feed rate and other machining geometry. In addition, this course introduces the basic programming for cnc machine such as turning and machining centers. Students will be introduced to the new manufacturing technologies and processes.

REFERENCES

1. Kibbe, R.R., Neely, J.E., White, W.T, & Meyer, R.O., 2010, Machine Tool Practices, 9th Edition, Upper Saddle River, NJ: Prentice Hall.
2. Prakash Joshi, 2007. Machine Tools Handbook, McGraw Hill Professional
3. DeGarmo, E. P., Black, J. T. and Kohser, R. A., 2017, Materials and Processes in Manufacturing, 12th Edition, John Wiley and Sons, New York.
4. Kalpakjian, S., and Schmid, S. R., 2014, Manufacturing Engineering Technology, 7th Edition, Prentice Hall International.

BMKT 2433
ENGINEERING DESIGN/
REKA BENTUK KEJURUTERAAN

LEARNING OUTCOMES

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

1. Categorize the methods and design concepts used in the engineering design process.
2. Composes a working design prototype to meet specified needs with appropriate consideration on the learned methods in the engineering process.
3. Develop an awareness of project management in the engineering design process.

SYNOPSIS

The methodology of design solutions and best practices in product design. Latest product development: the determination of market needs, determination design specifications, engineering concept generation, concept selection, detailed product specification, functional analysis, material selection. Innovative solutions. Creativity in the industry design, design visualization and anthropometric. Portfolio preparation and presentation.

REFERENCES

1. Rudolph J Eggert, Second Edition 2010. Engineering Design. Pearson Prentice Hall.
2. Ulrich, K. T. and Eppinger, S. D. 2015. Product Design and Development.
3. Mcgraw-Hill Ullman, D.G. 2015.The Mechanical Design Process.
4. Mcgraw-Hill Education (Asia), Singapore. Cross, N., 2008. Engineering Design Methods: Strategies for Product Design, 4th Ed., John Wiley And Sons, West Sussex UK.

BMKT 2523
FLUID MECHANICS/
MEKANIK BENDALIR

LEARNING OUTCOMES

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

1. Apply fluid mechanics concept in solving fluid statics and fluid dynamics problem.
2. Measure related parameter by using appropriate techniques in fluid mechanics application.
3. Demonstrate the ability to compete tasks and assignment as a leader or a member in group effectively.

SYNOPSIS

Introduction to this course is about the basic physical properties of fluids. Then it covers the definition of pressure and head. Next it followed by derivation of hydrostatic equation and its application in pressure measurement, static forces analysis on immersed surface and buoyancy analysis. For fluid dynamics, it started with introduction to fluid dynamics and fluid flow analysis. Then it is continued by derivation of flow equations, the application of energy equation and bernoulli equation in the calculation of flow velocity, discharge, and head lost in piping systems. The last topic for this course is dimensional analysis and its application.

REFERENCES

1. Munson, B. R., Young D. F. and Okiishi, T. H., 2012, Fundamentals of Fluid Mechanics, 7th Ed., John Wiley & Sons, Inc, Asia.
2. Som, S. K. and Biswas, G., 2010, Introduction to Fluid Mechanics and Fluid Machines, Revised 2nd Ed., Tata McGraw-Hill, New Delhi.
3. Douglas, J. F., Gasiorek J. M. and Swaffield, J. A., 2011, Fluid Mechanics, 6th Ed., Prentice Hall, Spain.
4. Kundu, P. K., Cohen, I. M. and Dowling, D. R., 2011, Fluid Mechanics, 5th Ed., Academic Press, Waltham, USA.

SEMESTER 4

BMKT 3743
CONTROL & INSTRUMENTATION/
KAWALAN & INSTRUMENTASI

LEARNING OUTCOMES

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

1. Explain the dynamic behaviour and the details of the system through the analysis of the response system, response and stability of frequency.
2. Display the concept of controller and sensor elements/ transducer through learning and application of the device behaviour.
3. Explain effectively either individually or in group for any assignment and experiment.

SYNOPSIS

Introduction to Control System. Mathematical Modelling. Time Response. Stability of linear feedback system. Improve transient response and steady-state error: PID control. Root locus. Introduction to measurement and instrumentation. Static nature of performance measurement and instrumentation. Analysis of experimental data. Experimental uncertainty analysis. Signal Measurement system.

REFERENCES

1. Alan S. Moris and Reza Langari, 2011. Measurement and Instrumentation: Theory and Application, Academic Press.
2. HS Kalsi, 2011. Electronic Instrumentation, McGraw Hill.
3. Uday A. Bakshi and Ajay V. Bakshi, 2014. Electrical Measurements and Instrumentation, Technical Publication.
4. Norman S. Nise, 2011. Control Systems Engineering, 6th Edition, John Wiley & Sons Inc.
5. Richard C. Dort, Robert H. Bishop, 2011. Modern Control Systems, 12th Edition, Pearson.
6. Gopal, M, 2012. Control Systems: Principles and Design, 4th Edition, Mc Graw Hill.
7. Khalil Azha Mohd Annuar et. al., 2015. Control & Instrumentation, Penerbit UTeM.

BMKT 2323
SOLID MECHANICS/
MEKANIK PEPEJAL

LEARNING OUTCOMES

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

1. Apply the knowledge and principles of mechanics of materials in engineering design.
2. Display appropriate experimental techniques in mechanics of material through laboratory experiments.
3. Demonstrate the ability to complete engineering project using the principle of mechanics of material in group effectively.

SYNOPSIS

The course contains topics of introduction, stress, strain, hooke's law, bending, mechanical properties, transformation of stress, axial load, transformation of strain torsion, beam bending, transverse shear, combined loadings, deflection of beams and shafts and Mohr's circle.

REFERENCES

1. Hibbeler R.C., 2017, Statics and Mechanics of Materials, 5th Ed., Pearson.
2. Beer. F.P. Et Al. 2012. Mechanics Of Materials, 6th Edition in SI Units. Mcgraw-Hill.
3. Roy R. Craig, Jr. And Eric. M. Taleff 2020 Mechanics of Materials, 4th Ed. Wiley and Sons, New York
4. Beer, F. P. And Johnston Jr., E. R., Mazurek D.F., Cornwell P.J. dan Self, B.P., E. R., 2018, Vector Mechanics For Engineers , 12th Ed. in SI Units, Mcgraw Hill, New York.

PRE-REQUISITE

BMKT 1313
STATICS/ STATIK

BMKM 2313
BASIC TRIBOLOGY/
ASAS TRIBOLOGI

LEARNING OUTCOMES

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

1. Explain the basic principles of tribology and its importance in mechanical system.
2. Construct the tribological testing to determine the surface roughness, friction, wear and lubricant thickness.
3. Demonstrate the current tribological issue and it corrective action in a team.

SYNOPSIS

Introduction to basics and principles of Tribology, characterization of solid surface, interaction between solid surfaces, friction and wear, lubrication regimes and lubricants, rolling element bearing, tribological components failure, lube oil condition monitoring, micro/nano-Tribology.

REFERENCES

1. Raymond G., Bayer G. 2004. Mechanical Wear Fundamentals and Testing, 2nd Edition. Marcel Dekker, New York.
2. Strafford K.N., Smart R.S.C., Sare I. and Subramaniam C. 2017. Surface Engineering Processes and Applications, Technomic Publishing Co.
3. Suh, N. P. 1986. Tribophysics. Englewood Cliffs, NJ. Prentice-Hall.
4. Murphy, W., Black J. and Hastings G. 2016. Handbook of Biomaterial Properties, 2nd Ed. Springer, New York.

BMKM 2113
INTRODUCTION TO MAINTENANCE/
PENGENALAN KEPADA PENYELENGGARAAN

LEARNING OUTCOMES

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

1. Explain the principles in planning and implementing a maintenance work.
2. Construct the effective and productive approach used in current maintenance issue.
3. Demonstrate the appropriate techniques to be applied in maintenance work.

SYNOPSIS

Students will be introduced to the principle and management in maintenance engineering, such as Maintenance Strategy, Maintenance Systems, Maintenance Cost/ Budget, Turnaround Management, Basic TPM and OEE, Basic Reliability Centered Maintenance and Risk Based Inspection.

REFERENCES

1. Mobley, R.K.,, 2014, Maintenance Engineering Handbook, 8th Ed. McGraw-Hill Professional.
2. Smith, R., Mobley,R.K., 2003, Industrial Machinery Repair: Best Maintenance Practices Pocket Guide (Plant Engineering), Butterworth-Heinemann.
3. Mobley, R. K., 2002, An Introduction to Predictive Maintenance, 2nd Edition, Butterworth- Heinemann.
4. Joel Levitt, 2010, Complete Guide to Predictive and Preventive Maintenance, Industrial Press.

SEMESTER 5

BMKM 2213
INDUSTRIAL MOTOR/
MOTOR INDUSTRI

LEARNING OUTCOMES

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

1. Explain the working principle fundamental of industrial motor.
2. Construct the motor and drive connection for industrial motor.
3. Propose motor maintenance and troubleshooting for industrial motor.

SYNOPSIS

This course talks about basic electrical machine. The course contains all about motor principle, components, electrical circuit connection, behaviour, selection, efficiency and motor maintenance.

REFERENCES

1. Riazollah Firoozian, 2014, Servo Motor and Industrial Control, Springer US.
2. Rex Miller, 2013, Industrial Electricity and Motor Controls, McGraw Hill.

BMKM 3123
MAINTENANCE TECHNOLOGY & ASSET MANAGEMENT/ TEKNOLOGI PENYELENGGARAAN & PENGURUSAN ASET

LEARNING OUTCOMES

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

1. Distinguish the method and strategy for maintenance and asset management.
2. Reproduce by using computerized maintenance management system in maintenance problem.
3. Organise the best practices of maintenance and asset management.

SYNOPSIS

Students will be introduced to the maintenance strategy, calculating the life of each unit machine and instrument. Identifying maintenance workshop and scheduling, maintenance organization, effective use of maintenance resources, maintenance system, maintenance best practices, engineering economy such as weibull and pareto analysis, cost estimation, asset replacement analysis, risk analysis and control, application of reliability data, accident prevention, fire protection and cost control.

REFERENCES

1. Terry Wireman, 2014, Benchmarking Best Practices for Maintenance, Reliability and Asset Management 3rd. Ed. Industrial Press.
2. John D. Campbell, Andrew K.S. Jardine, Joel McGlynn, 2016, Asset Management Excellence: Optimizing Equipment Life-Cycle Decisions, 2nd Edition, CRC Press.
3. Nicholas Anthony John Hastings, 2010, Physical Asset Management, Springer.
4. John S. Mitchell, 2012, Physical Asset Management Handbook, 4th. Ed. Reliabilityweb.com

BMKM 3323
TRANSMISSION TECHNOLOGY/
TEKNOLOGI PENGHANTARAN

LEARNING OUTCOMES

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

1. Categorize the function of basic components in transmission system
2. Assemble the transmission system using different gear types
3. Demonstrate methods in analysing transmission system gear ratio and maintenance

SYNOPSIS

Introduction to gear drive: arrangement and tooth forms. Gearbox rating. Bearings and seals. Lubrication systems. Materials and heat treatments. Gear quality. Effect of quantity on cost. Planetary gear arrangement analysis. Gearbox installation. Gear unit operation: testing, start-up, condition monitoring. Maintenance analysis: scheduled maintenance

REFERENCES

1. Jack Erjavec, 2010, Today's Technician: Manual Transmissions and Transaxles, 5th Edition, Delmar Cengage Learning.
2. Lynwander, 2009, Gear Drive System: Design and Application, BBS.
3. Lechner and H. Naunheimer, 2011, Automotive Transmission.
4. Su, D. 2007. Gearing, Transmissions and Mechanical Systems, Wiley and Sons.
5. Haideri, F. 2006, Transmmision System Design, Nirali Prakashan Publishing.

BMKM 3333
MAINTENANCE DIAGNOSTIC AND
TROUBLESHOOTING/
DIAGNOSTIK DAN PENGENALPASTIAN MASALAH
PENYELENGGARAAN

LEARNING OUTCOMES

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

1. Analyse the techniques of machine diagnostics.
2. Display the methods of monitoring diagnostics data processing using methods of data analysis and diagnostics.
3. Demonstrate understanding in current diagnostics issues and able to explain the findings.

SYNOPSIS

Students will be exposed to basic diagnostics techniques and methods used in identifying the failure of the machinery system. Fault tree analysis method is important for the purpose of monitoring data for maintenance of a machine system as well. This course will also discuss the diagnostics data processing and distribution of statistical diagnostics for smooth management of maintenance work.

REFERENCES

1. H. P. Bloch and F.K. Gentner, 2012. Machinery Failure Analysis and Troubleshooting, 4th Ed. Vol.2, Butterworth-Heinemann.
2. J.H. Williams, A. Davies, P.R. Drake, 2009. Condition Based Maintenance and Machine Diagnostics, Springer, R. K. Mobley, 2014, Maintenance Engineering Handbook,8th Ed., Mcgraw Hill, Ny.
3. P. Kiameh, 2012, Power Plant Equipment Operation and Maintenance Guide, Mcgraw Hill Education.
4. N.P. Lieberman, 2009, Troubleshooting Process Operations, Pennwell Co.

BMKM 3343
MECHANICAL MACHINE MAINTENANCE/
PENYELENGGARAAN MESIN MEKANIKAL

LEARNING OUTCOMES

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

1. Identify the different techniques in mechanical machine.
2. Display maintenance techniques in mechanical components.
3. Demonstrate problem solving of real life condition regards to machine maintenance issues.

SYNOPSIS

The student will be exposed to the maintenance techniques, troubleshooting and fault diagnosis for mechanical equipment. Among the basic maintenance methods are: condition based monitoring, vibration analysis, alignment dynamic balancing and mechanical seals. Students also will be learned about troubleshooting and maintenance of various machines and components such as valve, pump, compressor, gear and turbine. The essential steps of disassemble, check, troubleshoot, repair and reassemble of mechanical components will be stressed in this course. All the works done will be written in the given report format. Some of the project or practical work will be done in group. High assessment mark will be given to assignment that implemented by following the procedure and completed in a period of time.

REFERENCES

1. Joel Levitt, 2010, TPM Reloaded: Total Productive Maintenance, 1st Edition, Industrial Press.
2. Daniel E. Whitney, 2004, Mechanical Assemblies: Their Design, Manufacture and Role in Product Development, Oxford University Press.
3. Smith, Ricky, and Bruce Hawkins. 2004 Lean Maintenance: Reduce Costs, Improve Quality, and Increase Market Share. Amsterdam: Elsevier Butterworth Heinemann.

SEMESTER 6

BMKT 3214
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA I

LEARNING OUTCOMES

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

1. Apply knowledge to proposal preparation of industry-based or practice- oriented project.
2. Imitate appropriate existing concepts in engineering technology fields.
3. Adhere to project's dateline and related procedure.
4. Explain the project proposal in oral and written forms effectively.
5. Report literature review and preliminary findings in a scientific manner.

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan, Universiti Teknikal Malaysia Melaka.

BMKM 3133
VIBRATION ANALYSIS AND MONITORING/
ANALISIS DAN PEMANTAUAN GETARAN

LEARNING OUTCOMES

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

1. Analyze machinery health condition using vibration-based condition monitoring method.
2. Measure vibration monitoring method using spectral analysis and other signal processing methods to predict machinery health condition.
3. Discuss the measured machinery vibration level with the team and present the machinery faults.

SYNOPSIS

Principle of vibration analysis, principle of vibration measurement and instrumentation, signal processing (sampling rate, filtering, time domain and frequency domain, power spectral density etc.) model testing, vibration based condition monitoring on gear, shaft, bearing and motor.

REFERENCES

1. Robert Bond Randall, 2014. *Vibration-based Condition Monitoring: Industrial, Aerospace and Automotive Applications,* John Wiley and Sons, ISBN 978-0-470-74785-8
2. Allan G. Piersol, Thomas L. Paez, Cyril M. Harris, 2015. *Harris' Shock and Vibration Handbook,* McGraw Hill Professional, ISBN 978-0-071-50819-3.
3. National Instruments, Machine Condition Monitoring Technical Library, 2013, National Instruments Inc. WWW.NI.COM.
4. Mechefske, Chris, 2013. Machine Condition Monitoring and Fault Diagnosis: Lecture Notes, Queens University.

BMKM 4173
CONDITION BASED MAINTENANCE/
PENYELENGGARAAN BERASASKAN KEADAAN

LEARNING OUTCOMES

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

1. Apply various condition based maintenance methods to monitor and identify engineering related problems.
2. Construct techniques by using various condition based maintenance methods and analyse abnormality from the collected data.
3. Demonstrate understanding in current condition based maintenance issues and able to explain the findings.

SYNOPSIS

Introduction of CBM and maintenance management, vibration monitoring method and fault detection, lubricant condition monitoring and fault detection, thermal monitoring condition, CBM in electrical machines, corrosion monitoring and non-destructive test (NDT) and non-destructive evaluation (NDE).

REFERENCES

1. Mohamed Ben-Daya, Uday Kumar, D. N. Prabhakar Murthy, 2016. Introduction to Maintenance Engineering: Modelling, Optimization and Management, John Wiley & Sons.
2. Diego Galar Pascual, Uday Kumar, 2016. Maintenance Audits Handbook: A Performance Measurement Framework, Crc Press.
3. Fuh-Gwo Yuan, 2016. Structural Health Monitoring (SHM) In Aerospace Structures, Woodhead Publishing.

BMKM 4243
INSTRUMENT CALIBRATION/
PENENTUKURAN INSTRUMEN

LEARNING OUTCOMES

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

1. Determine the importance of calibration and common calibration procedure for industrial instruments.
2. Organise industrial instrument calibration using acceptable international standard.
3. Discuss the calibration procedure with the team and report the calibration result.

SYNOPSIS

Introduction to calibration where students are exposed to the importance of gather precise and consistent data from test equipment. Students also been teaching on how to maintained high quality calibration system.

REFERENCES

1. Richard S. Figliola & Donald E. Beasley, 2014. Theory and Design for Mechanical Measurements, 6th Ed. John Wiley & Sons, Inc.
2. N.V. Ragavendra & L. Krishnamurthy, 2013. Engineering Metrology & Measurements, Oxford University Press.

BMKM 4163
RELIABILITY, MAINTAINABILITY & RISK/
KEBOLEHARAPAN, KEBOLEHSENGGARAAN DAN RISIKO

LEARNING OUTCOMES

After completing the course, students will be able to:

1. Analyse important data with regards to reliability, maintainability and risks of machine.
2. Apply modelling method in diagnosing machine problems.
3. Propose the appropriate techniques to be applied in reliability, maintainability and risk.

SYNOPSIS

Students will be exposed to statistical method of machine failures, Pareto analysis, trend analysis, weibull and graphic analysis of machines reliability, the courses include maintainability analysis, Fault Tree Analysis, reliability block diagram.

REFERENCES

1. Gulati, R, and Smith, R., 2009, Maintenance and Reliability best practices, Industrial Press Inc
2. Stephen J, 2005, Improving maintenance and reliability through culture change, Industrial Press Inc.
3. Narayan, V., 2004, Effective Maintenance Management: Risk and reliability strategies for optimizing performance, Industrial Press Inc.
4. David John Smith,2005., Reliability, Maintainability and Risk: Practical Methods for Engineer, 7th. Ed. Butterworth-Heinemann.
5. Dhillon B.S.,2006. , Maintainability, Maintenance and Reliability for Engineers

BMKH 4233
MAINTENANCE OF HVAC SYSTEM/
PENYELENGGARAAN SISTEM HVAC

LEARNING OUTCOMES

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

1. Evaluate the performance of any HVAC System and construct maintenance instruction to solve any HVAC problem.
2. Demonstrate maintenance procedure and management of maintenance system.
3. Complete maintenance procedures effectively with planning among team members.

SYNOPSIS

HVAC environment, average temperature. Energy economics: units, degree-days, thermal fluidity. Heat loss calculation, heat absorption pump, and heater storage. Ventilation and air-conditioning: sensible heat, mechanical ventilation. Hot water and cold-water storage.

REFERENCES

1. Robert C. Rosaler, 1998, HVAC Maintenance and Operation Handbook, McGraw-Hill Professional.
2. David W. Bearg, 1993, Indoor Air Quality and HVAC System, Lewis Publishers.
3. Guy W. Gupton, 2002, HVAC Control: Operation and Maintenance, the Fairmont Press, Inc.
4. Samuel C. Sugarman, 2005, HVAC Fundamentals, the Fairmont Press, Inc.
5. Samuel C.S., Samuel C.M., 1992, HVAC System: Operations, Maintenance and Optimization, 1st Edition, Prentice Hall.

BMKM 3233
INDUSTRIAL CONTROL TECHNOLOGY/
TEKNOLOGI KAWALAN INDUSTRI

LEARNING OUTCOMES

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

1. Analyze the basic concepts, terminologies and operating principle of the elements related to industrial control system.
2. Construct the PLC wiring system and programming language for a specific problem-based application.
3. Perform individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This course will provide the students both theoretical concepts related to industrial control system and a practical to the Programmable logic controller (PLC) which is generally used in the industrial control. Extensive practical-oriented and hands on session will be given using OMRON PLC Training Kit equipment. The graphical programming tools, GRAFCET will be introduced in the course. Nevertheless, IR 4.0 elements such as big data and analytics segment also embedded in the course. The topics as listed below:

1. Introduction to Industrial Control
2. Discrete control elements and Relay Ladder diagram
3. Programmable logic controller (PLC)
4. Discrete sensors and actuators
5. GRAFCET

This course is the authentic problem based purposely to expose the students with real engineering problems in the industries.

REFERENCES

1. John Stenerson. 2003. Industrial Automation and Process Control. Prentice Hall.
2. Mikell P. Groover. 2008. Automation, Production Systems, and Computer-Integrated Manufacturing, 2nd Ed., Prentice Hall.
3. Killian C.T. 2001. Modern Control Technology: Components and Systems, 2nd Ed, Delmar.
4. Pérez Adrover. 2012. Introduction to PLCs: A Beginner's Guide to Programmable Logic Controllers.
5. Dag H. Hanssen. 2015. Programmable Logic Controllers: A Practical Approach to IEC 61131-3 using CoDeSys.

SEMESTER 7

BMKT 4224
BACHELOR DEGREE PROJECT II/
PROJEK SARJANA MUDA II

LEARNING OUTCOMES
After completing the course, students will be able to:
1. Discuss solution to the proposed industry-based or practice- oriented project.
2. Demonstrate project findings using appropriate techniques with an understanding of its limitations.
3. Display self-reliance in working independently and cooperates in group activities.
4. Display the ability to present the project findings in oral and written forms effectively.
5. Report literature review and project potential in scientific manner with a recognition of the strengths, weaknesses and opportunity for improvement.

SYNOPSIS
This is the second part of the Bachelor Degree Project. Students are expected to continue the project done in Bachelor degree Project Part 1 till completion. At the end of the semester students are required to submit the Bachelor Degree Project report both orally and in writing for assessment.

REFERENCES
1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE
BMKT 3214
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA I

BMKM 4143
MAINTENANCE AWARENESS IN DESIGN/
KESEDARAN PENYELENGGARAAN DALAM REKA BENTUK

LEARNING OUTCOMES
After completing the course, students will be able to:
1. Justify the maintainability and reliability of a product and a system.
2. Integrate design and reliability tools in problem solving during product and system development.
3. Present the finding of reliability and design of a system or product in a team.

SYNOPSIS
Parameters that can be used when designing the MTTR, MTBF, learn from failure-feedback information to the machine design, FMEA, QFD, the House of Quality, analysis of serial and parallel system, redundancy concept, multiple criteria and resource allocation.

REFERENCES
1. Stephen J, 2005, Improving maintenance and reliability through culture change, Industrial Press Inc
2. David John Smith,2005., Reliability, Maintainability and Risk: Practical Methods for Engineer, 7th Ed. Butterworth-Heinemann
3. Rudolph Frederickstapelberg, 2009, Handbook of Reliability, Availability, Maintainability and Safety in Engineering Design.
4. Ricardo Manzini.Alberto Regattieri.Hoang Pham. Emilio Ferrari,2010, Maintenance for Industrial System, Springer.

BMKM 4353
OIL & WEAR DEBRIS ANALYSIS/
ANALISIS MINYAK DAN SERPIHAN

LEARNING OUTCOMES

After completing the course, students will be able to:

1. Analyze oil and wear debris using various oil analysis methods to determine oil quality.
2. Integrate the data collected through various oil analysis methods in order to analyze failures and cause of parameter changes in the oil.
3. Demonstrates problem solving of real life condition regards to oil analysis issues in a group assignment.

SYNOPSIS

This course the discuss role of oil and wear debris analysis as a method that applied in machinery maintenance. Properties of oil properties such as density, viscosity, etc are introduced. The effect of temperature and other factor that affects oil degradation during the machine operation are discussed. Standard testing and analysis method typically employed to characterize oil properties are introduced in this course. This course also discusses basic analysis method on wear debris samples resulting from the machinery components interactions that can be used to identify and troubleshoot the machines problem. Method of collecting oil and wear debris samples at regular rate also introduced.

REFERENCES

1. H. P. Bloch and F.K. Gentner, 2012. Machinery Failure Analysis and Troubleshooting, 4th Ed. Vol.2, Butterworth-Heinemann.
2. J. Denis, J. Briant, And J.C. Hipeaux, 2000, Lubricant Properties and Testing, Edition Technip.
3. R. C Mortier, M. F. Fox, S.T. Orszulik, 2012, Chemistry and Technology of Lubricants, Springer.
4. Bhushan, B, 2001., Vol. 2, Modern Tribology Handbook, Crc Press.
5. Bhushan, B. 2013. Introduction to Tribology 2nd. Ed. Wiley and Sons.

BMKM 3154
BUILDING INSPECTION AND MAINTENANCE/
PEMERIKSAAN DAN PENYELENGGARAAN BANGUNAN

LEARNING OUTCOMES

After completing the course, students will be able to:

1. Distinguish the system of mechanical services and basic electrical in building.
2. Construct maintenance and checking procedures for equipment and system in building through laboratory experiments.
3. Integrate mechanical services provided in building system into engineering practices.

SYNOPSIS

Students will be exposed to basic plant facilities, equipment and plant operations as well as various methods of plant inspection and essential practical skills necessary to ensure smooth operation of a plant. Basically in buildings: thermal comfort, the average temperature of the radiation, the index of the cold. Energy Economics: units, degree days, thermal conductivity. Calculation of heat loss: the thermal resistance, conductivity terms, polietana. Heating: district heating, heat pump, absorption, storage heaters. Ventilation and air cooling: thermal taste, mechanical ventilation. Water supply, hot and cold water: ball valve, zeolite, the secondary circulation. Sewage systems: close, sanitary equipment, ventilation flue. Service area and the plant: electricity sub-stations, mechanical aerators.

REFERENCES

1. Kevin Ruelle, Rick Kaletsky, 2006. OSHA Inspections: Preparation and Response, 10th Printing, National Safety Council.
2. Clifford Matthews, 2004. Handbook of Mechanical In-Service Inspection: Pressure Systems and Mechanical Plant, Wiley.
3. Brian Wood, 2009, Building Maintenance, Wiley-Blackwell.
4. Ryan Cuzan, 2009, Manager's guide to building preventive maintenance, CRC press.
5. Chanter B., and Swallow,P., 2007, Building Maintenance management, Blackwell.

SEMESTER 8

BMKT 4236
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME
At the end of the course, students should be able to:
1. Build technical competencies and skills gained through their internship.
2. Prepare a report on the industrial field daily activities in the log book systematically.
3. Develop effectively with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor f Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BMKT 4246
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME
At the end of the course, students should be able to:
1. Produce industrial training report.
2. Present report orally on working experience.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE
Student required to pass Industrial Training BMMU 4786 in order to pass Industrial training report.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BMMV COURSE CORE COURSES (K)

SEMESTER 1

BMKT 1123
TECHNICAL PHYSICS/
FIZIK TEKNIKAL

LEARNING OUTCOMES

Upon completion of this course, the student should be able to:

1. Apply the physics concept systematically in engineering.
2. Display an ability to follow lab procedure in handling physic experiment through lab session.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This course will discuss about Mechanics: Physical Quantities and Measurements, Kinematics of Linear Motion, Force, Momentum and Impulse, Work, Energy and Power, Static, Circular Motion, etc. Properties of Matter: Static, Dynamics, Circular Motion, Simple Harmonic, Moment of Inertia, Density and Specific Gravity, Hydrostatics, Elasticity, Friction, Viscosity, Osmosis, Diffusion, Acceleration and Newton's Second Law of Motion, Motion with a Changing Velocity and Ohm law. Thermodynamics, Wave, Light & Sound. All topics covered are basic knowledge that essential for engineering programs.

REFERENCES

1. Giancolli DC, "Physics for Scientists and Engineers with Modern Physics", 5th Edition, Pearson Prentice Hall, 2021.
2. "Physics for Scientists and Engineers with Modern Physics", 10th Edition, Cengage learning, 2019.
3. Giambatista A., Richardson B.M and Richardson R.C., "College Physics", 5th Edition, Mc-Graw Hill, 2020.
4. Walker J.S., "Physics", 5th Edition, Addison Wesley, 2017.

BMKT 1313
STATICS/
STATIK

LEARNING OUTCOMES

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

1. Describe the physical sciences of statics concepts.
2. Construct statics experiments to recognize the engineering mechanics of statics principles.
3. Explain effectively as an individual and assist group members for experimental and assignment works.

SYNOPSIS

An introduction to the basic concept of statics as physical sciences, system of units, scalars and vectors, free body diagram, forces system, force system resultants and moment, equilibrium of a particle, equilibrium of a rigid body, structural analysis (trusses analysis and simple frames and machines), friction and center of gravity and centroid.

REFERENCES

1. Hibbeler R.C., 2017, Engineering Mechanics Statics, 14th SI Ed., Prentice Hall, New York.
2. Beer, F. P. And Johnston Jr., E. R. And Eisenberg, E. R., 2016, Vector Mechanics for Engineers - Statics, 11th Ed. in SI Units, Mcgraw Hill, New York.
3. Meriam, J. L. and Kraige L. G., 2014, Engineering Mechanics Static SI Version, 8th Ed., John Wiley & Sons, New York.
4. Pytel and Kiusaalas. 2017. Engineering Mechanics-Static. 4th Ed. Cengage Learning.
5. Michael P., Gary G.,F. Constanzo 2013. Engineering Mechanics- Statics.2nd Es. Mcgraw-Hill Higher Education.

BMKT 1413
ENGINEERING GRAPHICS/
GRAFIK KEJURUTERAAN

LEARNING OUTCOMES

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

1. Apply fundamental of technical drawing to produce standard mechanical part and assemblies drawing documents.
2. Construct typical mechanical engineering drawing using CAD software.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

The course concentrates on computer aided design (CAD) software. AutoCAD engineering drawing software is used to produce standard engineering drawing. The students will be exposed to cad interface, editing commands, coordinate system, template preparation and layer in order to produce various types of engineering drawings.

REFERENCES

1. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. and Novak, J. E.,Lockhart S., 2016, Technical Drawing With Engineering Graphics, 15th Ed., Pearson & Prentice Hall, New Jersey.
2. Mark Dix, Paul Riley, 2017, Discovering Autocad 2017, Prentice Hall, London.
3. Scott Onstott, 2013, Autocad 2014 And Autocad Lt 2014 Essential, John Wiley & Sons, Inc.
4. Cheryl R. Shrock And Steve Heather, 2014, Beginning Autocad 2015, Industrial Press, Inc.

BMKT 1713
PRINCIPLE OF ELECTRIC & ELECTRONIC/
PRINSIP ELEKTRIK & ELEKTRONIK

LEARNING OUTCOMES

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

1. Apply basic electrical and electronic concept in solving circuits problem.
2. Develop electrical circuit and justify the measured values using appropriates approach.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

This course will cover on the topics of electrical and electronic components, emphasizing on electric circuit theory such as components and measurement instruments, circuit analysis. For electronic principle, it will cover on the topics of electronic devices such as operational amplifiers and digital electronics it will deals with topics such as system numbers, logic gates, boolean operation, combination logic circuits, and digital circuit application.

REFERENCES

1. Thomas L. Floyd, 2014, Principles Of Electric Circuits, 9th Ed., Prentice Hall.
2. Thomas L.Floyd, 2015, Digital Fundamental, 11th Ed., Pearson Education.
3. Alexander, C.K., 2017, Fundamental Of Electric Circuit, 6th Ed., Mcgraw Hill.
4. Nilsson, J. W. and Riedel, S. A., 2015, Electric Circuit, 10th Ed., Prentice Hall.
5. Roger Tohkeim, 2014, Digital Electronics Principles & Applications, 8th Ed., Mcgraw Hill.

SEMESTER 2

BMKT 1133
TECHNICAL CHEMISTRY/
KIMIA TEKNIKAL

LEARNING OUTCOMES

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

1. Explain the fundamental of chemistry principle.
2. Demonstrate technical chemistry principles through laboratory experiment
3. Discuss technical solution for engineering problems using relevant chemistry principles.

SYNOPSIS

The course introduce the concepts in chemistry: Chemistry and Measurement; Atoms, Molecules and Ions; Chemical Reaction and Stoichiometry; Electronic Structure and Periodic Table; Chemical Bonding; Properties of Matter; Thermochemistry.

REFERENCES

1. Chang, Raymond (2019). “Chemistry”. 13th Ed. McGraw Hill. USA.
2. Timberlake (2020). “Basic Chemistry”. 6th Ed. Pearson Education International.
3. Halimaton Hamdan et al. (2001). “Kimia Asas Sains dan Kejuruteraan”. Johor Bahru.

BMKT 2433
ENGINEERING DESIGN/
REKA BENTUK KEJURUTERAAN

LEARNING OUTCOMES

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

1. Categorize the methods and design concepts used in the engineering design process.
2. Composes a working design prototype to meet specified needs with appropriate consideration on the learned methods in the engineering process.
3. Develop an awareness of project management in the engineering design process.

SYNOPSIS

The methodology of design solutions and best practices in product design. Latest product development: the determination of market needs, determination design specifications, engineering concept generation, concept selection, detailed product specification, functional analysis, material selection. Innovative solutions. Creativity in the industry design, design visualization and anthropometric. Portfolio preparation and presentation.

REFERENCES

1. Ulrich, K. T. and Eppinger, S. D. 2016. Product Design and Development, New York McGraw-Hill Education.
2. Rudolph J Eggert, Second Edition 2005. Engineering Design. Pearson Prentice Hall.
3. Ullman, D.G. 2016.The Mechanical Design Process, 5th Ed., New York McGraw-Hill Education.
4. Cross, N., 2008. Engineering Design Methods: Strategies for Product Design, 4th Ed., John Wiley And Sons, West Sussex UK.

BMKT 1623
MANUFACTURING PRACTICES/
AMALAN PEMBUATAN

LEARNING OUTCOMES

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

1. Demonstrate proper use of all equipment and requirement
2. Produce product based on technical drawing that meet specific tolerance.
3. Perform the process according to the proper procedure.

SYNOPSIS

The practice consists of introduction to basic knowledge of using manual hand tools and equipment, machine tools, welding, fabrication, lathe, milling, and some manual work within manufacturing daily activities. It introduces common equipment for performing manufacturing works such as lathe and milling machine, arc welding, TIG/MIG welding, sheet metal forming etc. Due to its nature as introductory course, students are required to prepare at home before having the practice to acquire any knowledge concerning the practices.

REFERENCES

1. Kalpakjian, S. and Schmid R. (2020), Manufacturing Engineering and Technology, 8th Edition, Prentice Hall.
2. Mikell P. Groover, Fundamentals of Modern Manufacturing Materials, Processes, and Systems, 7th Edition, John Wiley & Sons, 2019.
3. Mikell P. Groover, Principles of Modern Manufacturing SI Version, 6th Edition, John Wiley & Sons, 2016.

BMKT 1613
ENGINEERING MATERIALS/
BAHAN KEJURUTERAAN

LEARNING OUTCOMES

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

1. Explain the structures, properties and processing of engineering materials.
2. Display the ability to determine the microstructures and mechanical properties of various materials.
3. Construct solution for engineering material problems.

SYNOPSIS

This course introduces basic concepts of engineering materials that covers introduction to engineering materials, inter-atomic bonding, crystalline structure and imperfections in solid. Explanation on different type of engineering materials (i.e. metal, polymer, ceramic, composite and semiconductor), its mechanical properties, basic application and processing are also included. Introduction to the binary phase diagrams (composition and microstructure correlation) is also given.

REFERENCES

1. Callister W.D. and Rethwisch D.G, 2018, Fundamentals of Materials Science and Engineering, 5th Edition, John Wiley & Sons.
2. Smith W. F., 2019, Foundation of Materials Science and Engineering, 6th Edition, Mcgraw Hill.
3. Askeland D. R., 2016, The Science and Engineering of Materials, 7th Edition, Cl-Engineering.
4. Serah, A. M., 2017, Engineering Materials for Engineering Technologist. Melaka: Universiti Teknikal Malaysia Melaka.

SEMESTER 3

BMKT 2633
MEASUREMENT AND INSTRUMENTATION/
PENGUKURAN DAN INSTRUMENTASI

LEARNING OUTCOMES

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

1. Analyse the basic elements of common measurement systems.
2. Perform suitable measurement methods for a given issue.
3. Measure the performance of a measurement system.

SYNOPSIS

Measurement and instrumentation course covers three main areas; dimensional metrology, measurement analysis, and surface/texture measurement. In the dimensional metrology, students will be expose to three types of measurements; linear, angle and geometrical. Besides that, measurement of screw thread also covered in this course. Students will be taught from basic measuring instruments and will be introduced to the usage of the high precision measuring instruments that are Coordinate Measuring Machine and CNC Roundness measuring. In the measurements analysis, students will be required to describe the standard Measurement, measurement process, process capability, measurement errors, limits, tolerances and fits. In surface/texture measurement, students will perform the measurement of surface texture.

REFERENCES

1. Lau Kok Tee, and Saiful Naim Sulaiman (2020) Dimensional Measurement and Instrumentation for Technologist, Penerbit Universiti, Universiti Teknikal Malaysia Melaka
2. Connie, D. (2015). Fundamentals of Dimensional Metrology, 6th Edition. Cengage Learning.
3. Kalpakjian, S., Schimd, S. R., (2014). Manufacturing Engineering and Technology, 7th Edition. Prentice Hall.
4. Bucher, J. L. (2012). The Metrology Handbook, 2nd Edition. SQ Quality Press.
5. Campbell, R. G., Roth, E. S. (2002). Integrated Product Design and Manufacturing Using Geometrical Dimensioning and Tolerancing. Marcel Dekker, Inc.

BMKT 2733
MICROPROCESSOR TECHNOLOGY/
TEKNOLOGI MIKROPEMPROSES

LEARNING OUTCOMES

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

1. Describe the basic concepts of digital system, combinational and sequential logic circuit.
2. Explain the microprocessor fundamental, internal architecture of microprocessor and programming technique.
3. Follow the lab manual to complete tasks and assignment as individual or in group effectively.

SYNOPSIS

This course will essentially divide into two sections; digital electronics and microprocessor. The first section covers topics on digital electronic that include Introduction to Digital Concepts, Logic Gates, Combinational Logic and Data Control Devices Flip Flops and Sequential Logic Circuits. The next section will deal with topics such as Microprocessor Fundamentals, Introduction to Intel 8085 Microprocessor Hardware, Introduction to Intel 8085 Microprocessor Software and Programming Techniques with Additional Instructions.

REFERENCES

1. Ramesh S. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085, 6th Edition, Prentice Hall, 2013.
2. William Kleitz, Digital and Microprocessor Fundamental, 4th Edition, Prentice Hall, 2003.
3. Barry B. Brey, The Intel Microprocessor, 7th Edition, Prentice Hall, 2006.

BMKT 2643
MANUFACTURING PROCESS/
PROSES PEMBUATAN

LEARNING OUTCOMES

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

1. Explain the fundamental concepts of manufacturing processes.
2. Differentiate the application of various manufacturing processes.
3. Construct various skills of manufacturing techniques as an individual or a group.

SYNOPSIS

This course introduces the students to manufacturing and the aspects of manufacturing, metal-casting processes and equipment's, forming and shaping processes and equipment's, joining processes, manufacturing materials, and material-removal processes and machines.

REFERENCES

1. S. Kalpakjian, S.R. Schmid, Manufacturing Engineering and Technology SI Edition, Prentice Hall, 2014.
2. M.P. Groover, Fundamentals of Modern Manufacturing. Materials, Processes and Systems 4th Edition, John Wiley & Sons, Inc, 2010.
3. M. P. Groover, Introduction To Manufacturing Processes, 3rd Edition, Hoboken, NJ: Wiley, 2012.
4. P. N.Rao, Manufacturing Technology Foundry, Forming and Welding, 1st Edition, Mc Graw Hill, 2009.
5. P. N. Rao, Manufacturing Technology Metal Cutting and Machine Tools, 2nd Edition, Mc Graw Hill, 2009.
6. Amitabha Ghosh, Asok Kumar Mallik, Manufacturing Science, EWP New Dehli, 2009.

BMKT 2513
THERMODYNAMICS/
TERMODINAMIK

LEARNING OUTCOMES

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

1. Apply the basic concepts of thermodynamics, the First Law of Thermodynamics and the Second Law of Thermodynamics to closed and open systems.
2. Follow instructions in laboratory sheets when conducting thermodynamic experiments.
3. Complete individual or group assignments within the time given.

SYNOPSIS

This course covers the basic concepts and definitions of engineering thermodynamics, energy, work and heat, properties of pure substances (relationships of *P-v, T-v, P-T* and *T-s* diagrams), First Law of Thermodynamics, Second Law of thermodynamics and Entropy.

REFERENCES

1. Cengel, Y. A. and Boles, M. A..2014. Thermodynamics: An Engineering Approach, 8th Ed, McGraw Hill. Singapore.
2. S.C. Gupta, 2008. Thermodynamics, 1st Ed, Pearson Education (Singapore) Pte. Ltd.
3. Sonntag, R.E., Borgnakke. C, Van. and Gordon J., 2008. Fundamentals of Thermodynamics, 7th Edition, John Wiley & Sons, Inc.New York.
4. Eastop, T. D., And Mcconkey, A., 2011, Applied Thermodynamics for Engineering Technologists, 5th Ed, Pearson & Prentice Hall. New York.

BMKT 2523
FLUID MECHANICS/
MEKANIK BENDALIR

LEARNING OUTCOMES

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

1. Apply fluid mechanics concept in solving fluid statics and fluid dynamics problem.
2. Measure related parameter by using appropriate techniques in fluid mechanics application.
3. Demonstrate the ability to complete tasks and assignment as a leader or a member in group effectively.

SYNOPSIS

Introduction to this course is about the basic physical properties of fluids. Then it covers the definition of pressure and head. Next it followed by derivation of hydrostatic equation and its application in pressure measurement, static forces analysis on immersed surface and buoyancy analysis. For fluid dynamics, it started with introduction to fluid dynamics and fluid flow analysis. Then it is continued by derivation of flow equations, the application of energy equation and Bernoulli equation in the calculation of flow velocity, discharge, and head lost in piping systems. The last topic for this course is dimensional analysis and its application.

REFERENCES

1. Munson, B. R., Young D. F. and Okiishi, T. H., 2012, Fundamentals of Fluid Mechanics, 7th Ed., John Wiley & Sons, Inc, Asia.
2. Som, S. K. and Biswas, G., 2010, Introduction to Fluid Mechanics and Fluid Machines, Revised 2nd Ed., Tata McGraw-Hill, New Delhi.
3. Douglas, J. F., Gasiorek J. M. and Swaffield, J. A., 2011, Fluid Mechanics, 6th Ed., Prentice Hall, Spain.
4. Kundu, P. K., Cohen, I. M. and Dowling, D. R., 2011, Fluid Mechanics, 5th Ed., Academic Press, Waltham, USA.

SEMESTER 4

BMKT 2423
MODELING AND COMPUTER ANALYSIS/
PERMODELAN DAN ANALISIS BERKOMPUTER

LEARNING OUTCOMES

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

1. Apply fundamental of engineering and technical drawing in mechanical design using advance CAD tools.
2. Conduct computer modelling, design and analysis using advanced CAD tools.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS

This course will empower the students with fundamental knowledge and technical skills of 3D solid modeling skills using industry-proven 3d mechanical cad software. The students will learn about the different techniques for creating surface and solid models with emphasis on design intent. The course includes hands-on exercises and best practice methods for students to interpret common error messages during part, assembly and drafting stages.

REFERENCES

1. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. And Novak, J. E.,Lockhart S., 2016, Technical Drawing With Engineering Graphics, 15th Ed., Pearson & Prentice Hall, New Jersey.
2. Planchard, D. & M. Planchard, Engineering Design With Solidworks 2012, Schroff Development Corporation, 2012.
3. Kirstie Plantenberg (2011), Introduction To Catia V5 Release 19 (A Hands-On Tutorial Approach), Schroff Development.

PRE-REQUISITE

BMKT 1413
ENGINEERING GRAPHICS/
GRAFIK KEJURUTERAAN

BMKT 2323
SOLID MECHANICS/
MEKANIK PEPEJAL

LEARNING OUTCOMES

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

1. Apply the knowledge and principles of mechanics of materials in engineering design.
2. Identify appropriate experimental techniques in mechanics of material through laboratory experiments.
3. Demonstrate the ability to complete engineering project using the principle of mechanics of material in group effectively.

SYNOPSIS

The course contains topics of introduction, stress, strain, Hooke's law, bending, mechanical properties, transformation of stress, axial load, transformation of strain torsion, beam bending, transverse shear, combined loadings, deflection of beams and shafts and Mohr's circle.

REFERENCES

1. Hibbeler R.C., 2013, Statics and Mechanics of Materials, 3rd SI Ed., Prentice Hall, New York.
2. Beer. F.P. Et Al. 2012. Mechanics Of Materials, 6th Edition in SI Units. Mcgraw-Hill.
3. Beer. F.P. Et Al. 2011. Statics and Mechanics of Materials, 1st Edition. Mcgraw-Hill.
4. Beer, F. P. And Johnston Jr., E. R. and Eisenberg, E. R., 2010, Vector Mechanics For Engineers - Statics, 9th Ed. in SI Units, Mcgraw Hill, New York.
5. Roy Craig Jr., 2011, Mechanics of Materials, 3rd Ed., John Wiley & Sons, New York.

PRE-REQUISITE

BMKT 1313
STATICS / STATIK

BMKT 2333
DYNAMICS & MECHANICS OF MACHINE/
DINAMIK & MEKANIK MESIN

LEARNING OUTCOMES

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

1. Describe the concept and principle of dynamics and mechanics of machine element.
2. Demonstrate the dynamics and mechanics of machine laboratory experiments.
3. Synthesize dynamics and mechanics of machine fundamentals into engineering practices.

SYNOPSIS

Introduction to basic principles based on kinematic and kinetic dynamics. The concept of displacement, distance, velocity, speed and acceleration. Application of newton's second law. The principle of work and energy, impulse and momentum of particles and rigid bodies. Transmission system based on the friction of motion, such as belts, brakes and dibble. Based delivery systems such as chains and gear teeth. Gear system. Balancing the dynamic system that includes balancing the body rotating plane and a parallel plane. Balancing of reciprocating motion as the body line of engines, radial engines and engine. Gyroscopic motion that includes a couple gyroscope. Gyro scope coupling effects. Simple harmonic motion and vibration consists of moving one degree of freedom. Free vibration. Damped free vibration. Forced damped vibration. Speed control of the cycle flywheel.

REFERENCES

1. Beer, F. P., Johnson, E.R., Clausen, W. E., (2013) Vector Mechanics For Engineers, Dynamics Si Units, 10th Edition. Mcgraw-Hill.
2. Hibbeler, R. C. (2013) Engineering Mechanics, Dynamics, 12th Edition. Prentice Hall.
3. Meriam, J. L. And Kraige, L. G. 2013. Engineering Mechanics, SI Version, 7th Edition. John Wiley.
4. Bedford, A. and Fowler, W. 2008. Engineering Mechanics: Dynamics (SI Units). 5th Edition.Prentice Hall.
5. Cleghorn, W. L., 2005, Mechanics of Machines, Oxford University Press.

PRE-REQUISITE
BMKT 1313
STATICS/ STATIK

BMKT 3533
HEAT TRANSFER/
PEMINDAHAN HABA

LEARNING OUTCOMES
Upon completion of this course, student should be able to:
1. Solve analytically and numerically problems related to performance evaluation and design of heat transfer equipment's.
2. Assemble laboratory equipment's according to the parameters investigated when conducting heat transfer equipment's.
3. Complete individual or group assignments within the time given.

SYNOPSIS
The introduction of the concept and definition of heat transfer engineering, energy, work, material thermal properties, mass transfer, the laws of the theory, empirical and analytical relationships. Numerical rules. Unsteady state conduction. Numerical analysis. Heat Transfer Simulation solution. Natural convection. Forced convection in laminar and turbulent flow in the plane and pipes. Phase change heat transfer. Thermal radiation on the body and a black surface. Low rate of heat transfer. Evaporation and condensation.

REFERENCES
1. Holman, J.P (2010). Heat Transfer. 10th SI Edition. McGraw Hill: Singapore.
2. Incopera, F.P. & Dewitt, D.P. (2014). Fundamental of Heat and Mass Transfer. 5th Edition, John Wiley and Sons: Toronto.
3. Cengel, Yunus A. (2011). Heat transfer: A Practical Approach. 4th Edition, McGraw Hill: New York.

BMKT 3543
PNEUMATIC AND HYDRAULIC TECHNOLOGY/
TEKNOLOGI PNEUMATIK DAN HIDRAULIK

LEARNING OUTCOMES
Upon completion of this course, student should be able to:
1. Apply knowledge of engineering fundamentals in order to analyse performance of hydraulic and pneumatic system.
2. Troubleshoot hydraulic and pneumatic system manually and using software.
3. Demonstrate ability to work effectively as individuals, members, or leaders in technical teams.

SYNOPSIS
This course covers the introduction of the hydraulic and pneumatic systems, types of pump, compressor and their working principles, types of valve, actuator and their usage, performance of the fluid power system, others fluid power system ancillaries and sensors, fluid power system circuit design and analysis with manual control and electrical control, fluid power symbols, the usage of computer software to design and simulate the fluid power system circuit, the usage of programmable logic controller in fluid power system circuit design and the application of fluid power in robotic and mobile hydraulic.

REFERENCES
1. Ilango S. 2007. Introduction to Hydraulics and Pneumatics. Prentice Hall-India. New Delhi.
2. Esposito A. 2003. Fluid Power with Applications .6th Ed. Prentice Hall. New Jersey.
3. Johnson, J.L. 2002. Introduction to Fluid Power. Delmar. New York.
4. Majumdar SR. 2002. Oil Hydarulic System Principles and Maintenance. Tata-McGraw Hill. New York.
5. Hehn A.H. 1993. Fluid Power Handbook.Vol 1. Gulf Publishing Company. Texas.

SEMESTER 5

BMKT 3743
CONTROL & INSTRUMENTATION/
KAWALAN & INSTRUMENTASI

LEARNING OUTCOMES

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

1. Construct experiments to determine the performance of controller and sensor elements or transducer.
2. Describe the dynamic behavior of the system through analysis of the system response.
3. Report the analysis of transient and steady state performance for first and second order control systems.

SYNOPSIS

At first, this course shall discuss the concept of instrumentation, the important of sensor, signal conditioning and data acquisition. Then it shall discuss the fundamental of control system; open and closed loop system; transfer function; block diagram reduction and signal flow graphs; modelling for electrical system, mechanical system and electromechanical system; transient and steady-state performance for first and second order systems; Routh Hurwitz criteria for stability and steady-state error analysis.

REFERENCES

1. Syed Najib and Maslan, 2nd Control Systems Engineering, Penerbit Utem, 2006.
2. Khalil Azha Mohd Annuar Et. Al., Control & Instrumentation, Penerbit Utem, 2015.
3. Alan S. Moris and Reza Langari, Measurement and Instrumentation: Theory and Application, Academic Press, 2011.
4. Norman S. Nise, Control Systems Engineering, 6th Edition, John Wiley & Sons Inc., 2011.
5. Richard C. Dort, Robert H. Bishop, Modern Control Systems, 12th Edition, Pearson, 2011.

BMKT 3653
PROJECT MANAGEMENT/
PENGURUSAN PROJEK

LEARNING OUTCOMES

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

1. Apply the core concepts and principles, functions, and process in project management.
2. Justify the important skills required and the necessary implementation methodology/ formulation in project management.
3. Develop a comprehensive & viable Project Proposal and deliver a presentation of the proposal.

SYNOPSIS

Project management is the systematic planning and co-ordination of people, activities and resources to ensure that a complex undertaking can be successfully achieved within a given time frame and budget. Classic project management has five main phases: initiation, planning, executing, controlling, and closing. The first phase is when the overall aim and enabling objectives are defined. It is the point at which a project manager can be identified along with the stakeholders in the project. The stakeholders include anyone likely to be affected by the execution and outcome of the project. The scope of the project then needs to be agreed, the resources checked, the team assembled and the risks assessed.

REFERENCES

1. Meredith, Mantel, Shafer and Sutton (2014). Core Concepts: Project Management in practice, 5th Edition, John Wiley & Sons.
2. Pinto, K. Jeffrey. (2016). Project Management, Achieving Competitive Advantage, 4th Edition. Pennsylvania State University, Prentice Hall.
3. Rosenau, M. (2005). Successful Project Management, 3 Ed., John Wiley & Sons.
4. Meredith, J., Mantel, S. and Mantel, S. Jr. (2009). Project Management: A Managerial Approach. New York, John Wiley & Sons Inc.

5. Gray, C.F and Larson, E.W, (2006). Project Management; A Managerial Perspective. McGrawHill
6. Russell, D., (2003). Managing High-Technology Programs and Projects, (3rd Edition). New York, John Wiley & Sons Inc.
7. Zaharna, R. S. (2001). Proposal Writing Handbook, Centre for Studies, Consultant and Technica Service. New York and Najah National University, Nablus.

BMKT 3443
INTEGRATED DESIGN PROJECT/
PROJEK REKABENTUK BERSEPADU

LEARNING OUTCOMES

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

1. Design solution by synthesizing manufacturing engineering technology knowledge that will solve broadly-defined engineering technology problems in accordance with relevant standards.
2. Utilize modern engineering technology and IT tools in facilitating solutions to broadly-defined engineering technology problems with an understanding of the limitations.
3. Evaluate the impact of the design product, component or processes in term of safety, environmental and sustainability factors.

SYNOPSIS

Integrated Design Project is a course where students have to design an engineering technology project to solve broadly defined problem. Broadly defined problem is engineering problems which cannot be pursued without a coherent and detailed knowledge of defined aspects of a professional discipline with a strong emphasis on the application of developed technology. The design project activities include project management, project planning, project management, design selection, design costing and sizing, analysis and evaluation. The course focuses on the implementation and integration of product/conceptual design development to produce a comprehensive final technical report, including engineering proposals and drawings, specifications and bills of material, cost estimates of development projects given to students, working in groups. Apart from basic engineering design, students are also required to integrate their knowledge of other engineering disciplines such as (but not limited to) structural analysis and design, including material selections, project scheduling techniques and sustainable development considerations into their overall project work. At the end of this course, the students will be able to comprehend the needs and requirements for product design procedures and are able to appreciate the importance of integration and synthesis of various disciplines of manufacturing, mechanical, etc and engineering knowledge.

REFERENCES

1. Ulrich, K. T. and Eppinger, Steven D., 2012, Product Design and Development, 5th Edition, McGraw Hill.
2. Chitale, A. K. and Gupta, R. C., 2006, Product Design and Manufacture, 3rd Edition, Prentice Hall, New Delhi, India.
3. Kalpakjian, S. and Schmid, S. R., 2001, Manufacturing Engineering & Technology, 4th Edition, Prentice Hall.
4. Cross, Nigel, (2010) Engineering Design Methods, Wiley.
5. W.Bolton, Mechatronics electronic control systems in mechanical and electrical engineering, 4th Ed., Prentice Hall, 2008.
6. Kutz, Myer, Mechanical Engineers Handbook-Manufacturing and Management, 3rd ed., John Wiley 2006.

BMKH 2113
FUNDAMENTAL OF HVAC & REFRIGERATION/
ASAS HVAC & PENYEJUKAN

LEARNING OUTCOMES

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

1. Categorise the principle of vapour compression refrigeration cycle for air-conditioning and refrigeration.
2. Construct experiment on vapour compression cycle application.
3. Explain the important of recovering of recycling used refrigerants to prevent environmental damage.

SYNOPSIS

This course deals with an introduction to the refrigeration and air conditioning system. Carnot cycle and thermodynamics properties phase diagrams such as p-h, T- s and p-v. Vapour compression and absorption refrigeration system. Working media used in the heating, ventilating and air conditioning (HVAC) system.

REFERENCES

1. A. G.F. Hundy, A.R. Trott & T.C. Welch 2008 Refrigeration and Air-conditioning. 4th Ed. Amsterdam: Butterworth-heinemann
2. B. Mcquiston. F. C. And Parker J. D.2005. Heating Ventilation and Air Conditioning: Analysis and Design. 6th Ed. New York: John Wiley. C.
3. Yunus Cengel And Michael Boles. 2015. Thermodynamic: An Engineering Approach. 8th Ed. Singapore: Mc Graw Hill Inc.
4. D. Jones W.P. 1980. Air Conditioning Applications and Design. New York: Edward Arnold(publisher) Ltd.
5. E. Jones W.P. 1985. Air Conditioning Engineering. New York: Edward Arnold (Publisher) Ltd.
6. F. Johnson W.M. 1997. Practical Cooling technology. New York: Delmar Publisher Usa

BMKT 3343
MECHANICAL VIBRATION/
GETARAN MEKANIKAL

LEARNING OUTCOMES

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

1. Analyze vibration for one and two degree of freedom systems in a simple engineering practice.
2. Solve the natural frequencies and mode shapes of a vibrating system.
3. Explain basic techniques of vibration control.

SYNOPSIS

Fundamental of vibration. One-degree-of-freedom system: free vibration of an undamped and damped systems. Harmonically excited vibration: forced undamped and damped systems; unbalance rotating mass; base excitation. Two-degree-of-freedom system: natural frequencies and mode shapes. Continuous structures: beam, string and plates. Design of vibration suppression: vibration isolation and vibration absorber.

REFERENCES

1. S. S. Rao, Mechanical Vibrations, 5th edition: Prentice Hall, 2018.
2. S. G. Kelly, Mechanical Vibrations: Theory and Applications, Cengage Learning, 2011.
3. L. Meirovitch, Fundamental of Vibration, McGraw-Hill, 2010.
4. D.J. Inman, Engineering Vibrations, 3rd edition, Pearson Education Inc, 2008.
5. S. G. Kelly, Schaum's Mechanical Vibrations, McGraw- Hill, 2006.

SEMESTER 6

BMKT 3214
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA I

LEARNING OUTCOMES

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

1. Apply knowledge to proposal preparation of industry-based or practice-oriented project.
2. Imitate appropriate existing concepts in engineering technology fields.
3. Adhere to project's dateline and related procedure.
4. Explain the project proposal in oral and written forms effectively.
5. Report literature review and preliminary findings in a scientific manner.

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Bachelor Degree Project Manual, Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan, Universiti Teknikal Malaysia Melaka.

BMKT 3453
COMPUTATIONAL SIMULATION/
SIMULASI BERKOMPUTER

LEARNING OUTCOMES

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

1. Develop an understanding for the theory and mathematical formulas used in solving a finite element analysis (FEA)
2. Perform the preprosessing, solving and post prosessing methods in CAE standard software.
3. Demonstrate verbally through presentation of simulation results based on mechanical engineering knowledge.

SYNOPSIS

This course provides students with an understanding of the numerical procedures in CFD and structure analysis through FEA. It will also deliver a proper background for the intelligent and appropriate use of commercial CFD and FEA software.

The course covers the basic concepts of fluid flow, introduction to CFD, solution of the Navier-Stokes Equations, turbulent flows, derivation of governing equations, discretization of governing equations using the finite difference and volume techniques, convergence acceleration, practical exercise using CFD software, introduction to finite elements method, formulation/ variational methods including potential energy and Galerkin methods and practical exercise using FEA software.

REFERENCES

1. Andersson, B., Andersson, R., Hakansson, L., Mortensen, M., Sudiyo, R. & Wachem, B.V., 2012, Computational Fluid Dynamics for Engineers, Cambridge University Press.
2. Anderson, J.D., 2006, Computational Fluid Dynamics The Basic with Application, McGraw-Hill: Singapore.
3. Chandrupatla, T.R. and Belegundu, A.D., 2012, Introduction to Finite Elements in Engineering, 4th Edition, Prentice Hall, New Jersey.
4. Saeed, M, 2008, Finite Element Analysis: Theory and Application with ANSYS, 3rd Edition, Pearson, New Jersey.

BMKV 3313
ENVIRONMENT & SUSTAINABILITY/
KELESTARIAN & ALAM SEKITAR

LEARNING OUTCOMES

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

1. Explain the concept of environmental management and sustainability in according to needs of Environmental Quality Act 1974 and its regulations.
2. Demonstrate type of pollution control system and conduct performance monitoring based on the environmental pollution problem.
3. Apply the Cleaner Production Concept for adapting the sustainable consumption and protection to solve environmental problem.

SYNOPSIS

In moving towards developed country and high income nation in 2020, industrial activities contribute significant impact to the economic growth and environment. To ensure the growth able to meet the need of sustainable development, industries have to eliminate, mitigate and reduce pollution arises from their industrial activities according to existing guidelines, laws and regulations. Therefore, this course will introduce various types of pollution control methods ranging from industrial effluents treatment system, air pollution control system and hazardous waste management.

REFERENCES

1. Davis, Mackenzie L, and David A Cornwell. Introduction to Environmental Engineering. 5th Edition. Singapore: Mc Graw Hill, 2013.
2. Davis, Mackenzie L, and Susan J Masten . Principle of Environmental Engineering and Science. New York: McGraw-Hill, 2014.
3. Peavy, Howard S, Donald R Rowe, and George Tchobanoglous. Environmental Engineering. Singapore: Mc Graw Hill , 1895
4. ILBS. Environmental Quality Act 1974. International Law Book Services, 2015

SEMESTER 7

BMKT 4224
BACHELOR DEGREE PROJECT II/
PROJEK SARJANA MUDA II

LEARNING OUTCOMES

After completing the course, students will be able to:

1. Discuss solution to the proposed industry-based or practice- oriented project.
2. Demonstrate project findings using appropriate techniques with an understanding of its limitations.
3. Display self-reliance in working independently and cooperates in group activities.
4. Display the ability to present the project findings in oral and written forms effectively.
5. Report literature review and project potential in scientific manner with a recognition of the strengths, weaknesses and opportunity for improvement.

SYNOPSIS

This is the second part of the Bachelor Degree Project. Students are expected to continue the project done in Bachelor degree Project Part 1 till completion. At the end of the semester students are required to submit the Bachelor Degree Project report both orally and in writing for assessment.

REFERENCES

1. Bachelor Degree Project Manual, Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE

BMKT 3214
BACHELOR DEGREE PROJECT I/
PROJECT SARJANA MUDA I

SEMESTER 8

BMKT 4236
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME
At the end of the course, students should be able to:
1. Build technical competencies and skills gained throughout their internship.
2. Prepare a report on the industrial field daily activities in the logbook systematically.
3. Develop effectively with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor f Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BMKT 4246
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME
At the end of the course, students should be able to:
1. Produce industrial training report.
2. Present report orally on working experience.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE
Student required to pass Industrial Training BMMU 4786 in order to pass Industrial training report.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BMKV 4323
WATER AND WASTE WATER TECHNOLOGY/
TEKNOLOGI AIR DAN AIR SISA

LEARNING OUTCOME

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

1. Able to apply type of water and wastewater treatment technology to treat different type of pollution in water and wastewater.
2. Develop a performance monitoring plan for water treatment and industrial effluent treatment facility.
3. Explain the philosophy of water and wastewater treatment process on sustainable development.

SYNOPSIS

The course outlines the introduction water and wastewater treatment engineering and technology. The course covers the primary, secondary and tertiary water and wastewater treatment facility technology. The specific technology requires different performance monitoring to ensure its optimum efficiency.

REFERENCES

1. George Tchobanoglous, Franklin L. Burton, Metcalf & Eddy, H. David Stensel, 2003, Wastewater Engineering: Treatment and Reuse McGraw-Hill, ISBN 9780071241403.
2. Mark J. Hammer 2013, Water and Wastewater Technology, Pearson Education, ISBN 9781292021041
3. Nicholas P. Cheremisinoff, 2001, Handbook of Water and Wastewater Treatment Technologies Butterworth-Heinemann, ISBN 9780080523842

BMKV 4343
AIR QUALITY AND POLLUTION CONTROL TECHNOLOGY/
TEKNOLOGI KUALITI UDARA DAN KAWALAN PENCEMARAN

LEARNING OUTCOME

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

1. Apply specific air pollution control system to a specific process.
2. Develop a performance monitoring plan of air pollution control system.
3. Describe the philosophy of air quality management and air pollution control system.

SYNOPSIS

The course outlines the introduction water and wastewater treatment engineering and technology. The course covers the primary, secondary and tertiary water and wastewater treatment facility technology. The specific technology requires different performance monitoring to ensure its optimum efficiency.

REFERENCES

1. William Licht, 1988, Air Pollution Control Engineering: Basic Calculations for Particulate Collection CRC Press, Inc., ISBN 9780824778989.
2. Karl B. Schnelle, Jr., Charles A. Brown, 2016, Air Pollution Control Technology Handbook, CRC Press ISBN 9781420036435.
3. John C. Mycock, 1995, Handbook of Air Pollution Control Engineering and Technology CRC Press, ISBN 9781566701068.

BMKV 4333
SOLID WASTE MANAGEMENT TECHNOLOGY/
TEKNOLOGI PENGURUSAN SISA PEPEJAL

LEARNING OUTCOME

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

1. Examine the solid waste management practices.
2. Responds effectively to identify and reduce the types of solid waste apparent in a factory and domestic.
3. 3. Propose plan for waste management system including recycling, landfilling, financing and life-cycle costing.

SYNOPSIS

Ecological action to protect the environment and conserve existing natural resources is an essential component of modern-day industrial societies. Environmental waste disposal and sustainable recycling of valuable resources from waste products are important fields requiring well trained disposal engineers with creativity and know- how. The course provides comprehensive training in this field and forms an interface between the wide range of specialist fields such as environmental sciences or process engineering to the planning, design, and management of efficient, economical and environmentally responsible solid waste disposal systems. Characterization of municipal solid waste; collection; transfer stations; waste minimisation and recycling; waste treatment, including size reduction, composing, incineration, emerging technologies; landfill disposal, including preparation of landfill management plans and operational aspects; introduction to planning of waste management systems.

REFERENCES

1. George Tchobanoglous, Frank Kreith. (2002). Handbook of Solid Waste Management (Mechanical Engineering), Second Edition, McGRAW-HILL: New York.
2. Ramesha Chandrappa, Jeff Brown. (2012). Solid Waste Management: Principles and Practice (Environmental Science and Engineering). Springer.
3. Christensen, Thomas H. (2011). Solid Waste Technology & Management. Chichester John Wiley & Sons.

4. Reddy, P. Jayarama. (2011). Municipal Solid Waste Management Processing, Energy Recovery, Global Examples. Hyderabad BS Pub.
5. Ludwig, Christian, Hellweg, Stefanie, Stucki, Samuel. (2003). Municipal solid waste management strategies and technologies for sustainable solutions. Springer Berlin.

BMKV 4353
INDUSTRIAL AND HAZARDOUS WASTE MANAGEMENT/
PENGURUSAN SISA INDUSTRI DAN SISA BERJADUAL

LEARNING OUTCOME

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

1. Analyse the risk and hazards caused by the existence of hazardous waste.
2. Handle a project to manage the disposal and treatment of hazardous waste.
3. Describe the cradle-to-cradle philosophy and methods of hazardous waste handling and disposal.

SYNOPSIS

The course outlines the introduction of hazardous waste and it's disposal and treatment methods. The course will convey the information on toxicology and ecology effect of hazardous waste. Treatment methods which include physicochemical treatments, biological methods, thermal methods and land disposal will be explained extensively.

REFERENCES

1. Micheal D. La Grega, Phillip L. Buckingham, Jeffret C. Evans, 2010, Hazardous Waste Management Waveland Press, Inc., ISBN 978-1577666936.
2. Cliff VanGuilder, 2012, Hazardous Waste Management: An Introduction, Mercury Learning and Information, ISBN 978-1936420261.
3. Gayle Woodside, 2010, Hazardous Materials and Hazardous Waste Management Chapman & Hall, ISBN 978-0471174493.

BMKV 4233
SMALL CRAFT TECHNOLOGY/
TEKNOLOGI KAPAL KECIL

LEARNING OUTCOME

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

1. Categorise the types of small craft and the means of their construction including their classification society involved.
2. Conduct assessment on stability, structural strength and performance of small craft vehicles.
3. Reports the project planning and execution of a small craft prototype construction.

SYNOPSIS

Introduction to small craft vehicles according to their types of supporting mode and operations, including the classification society which govern their structural design. The course will further explore the design, stability, engineering and control system associated with small craft vehicles. At the end of the lesson, the students will practically construct a prototype of small craft vehicle by using either steel/ aluminum or composite by applying standard construction practice.

REFERENCES

1. John Atkin (2011). Practical Small Boat Designs, International Marine Pub.
2. Ted Brewer (2012). Understanding Boat Design, International Marine Publishing
3. Introduction to Practical Marine Engineering I, Alan L. Rowen et al., The Society of Naval Architects and Marine Engineers, 2013
4. Introduction to Practical Marine Engineering II, Alan L. Rowen et al., The Society of Naval Architects and Marine Engineers, 2013
5. Hugo Du Plessis (2013). Fibreglass Boats: Construction, Gel Coat, Stressing, Blistering, Repair, Maintenance (5th ed), Adlard Coles Nautical

BMKV 4213
INTRODUCTION TO SHIP DESIGN & ARCHITECTURE /
PENGENALAN SENIBINA DAN REKABENTUK KAPAL

LEARNING OUTCOME

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

1. Evaluate the standard assessment of various marine vehicles at various loading conditions.
2. Reproduce a set of marine vehicles design which fulfilling the basic standard design requirements.
3. 3. Justifies the design produced based on certain standard guidelines.

SYNOPSIS

Introduction to type of marine vehicles which include ship principal dimension and terms, the form of vessel which include the conditions of equilibrium of floating body, the trim and change of trim, the small longitudinal inclination, the effect of free surface on initial stability and the strength of ships and ship vibration.

REFERENCES

1. Marine Engineer and Naval Architectures,
2. Naval Arrchitectures: Examples and Theory by Baxter, B.
3. Production Technology by Thomas G.G.
4. Material Science and Metallurgy by Pollack H.W

BMKV 4223
MARINE TECHNOLOGY SYSTEM/
SISTEM TEKNOLOGI MARIN

LEARNING OUTCOME

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

1. Identify requirements for repair, installation, modification, redesign and maintenance of machines and systems of ships in accordance to maritime laws and regulations.
2. Measure appropriate activities coordination to ensure safe shipboard functions and effective marine power plant operations through laboratory experiments.
3. Describe impact of operations of power plant and ship system on sustainable development.

SYNOPSIS

This course incorporates theory and practical experience to prepare students for the fast-paced marine industry. Students will be exposed to the operation and application of power plants and ship systems. The course focuses on developing competencies required to function as part of an engineering team at the operational level. Students can expect to gain knowledge and skills around shipboard functions and effective marine power plant operations. In addition, they will also be exposed with maritime law and regulations.

REFERENCES

1. Hayt, William H.; Kemmerly, Jack E.; Durbin, Steven M. Engineering circuit analysis. 8th ed. New York: McGraw- Hill, 2012. ISBN 9780071317061.
2. Mohan, Ned; Undeland, Tore M.; Robbins, William P. Power electronics: converters, applications, and design. 3a ed. John Wiley & Sons, John Wiley & Sons, 2016. ISBN 0471226939.
3. Saarlas, Maido. Steam and gas turbines for marine propulsion. 2nd ed. Annapolis: Naval Institute Press, 2014. ISBN 0870216902
4. Bernstein, Martin D.; Yoder, Lloyd W. Power boilers: a guide to section I of the ASME boiler and pressure vessel code. New York: Asme Press, 2015. ISBN 0791800563.

5. Principles of naval architecture, vol. 2, Resistance, propulsion and vibration. 2nd revision. Jersey City, NJ: The Society of Naval Architects and Marine Engineers, 1988-1989. ISBN 0939773015 (V. 2).
6. ASHRAE handbook: Fundamentals. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, 2014. ISBN 0910110964.

BMKV 4243
MARINE INSPECTION & MAINTENANCE/
PEMERIKSAAN DAN PENYELENGGARAAN MARIN

LEARNING OUTCOME

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

1. Classify type of marine machinery, electrical and control and hull structure for inspection and maintenance.
2. Follows appropriate procedure to ensure marine machinery, electrical and control and hull structure comply with marine safety and regulation through laboratory experiments.
3. Explain the impact of shipboard maintenance activities based on the four types of maintenance philosophies on sustainable development.

SYNOPSIS

Introduction to marine inspection and maintenance of marine machinery, electrical and control, including ship structure. In addition, student will learn on marine components of refrigeration, steering gears and pumping systems. In the end of the course, students are required to produce a shipboard inspection and maintenance plan.

REFERENCES

1. The Running and Maintenance of Marine Machinery, J. Cowley, Institute of Marine Engineers, 2012
2. Introduction to Practical Marine Engineering I, Alan L. Rowen et al., The Society of Naval Architects and Marine Engineers, 2013
3. Introduction to Practical Marine Engineering II, Alan L. Rowen et al., The Society of Naval Architects and Marine Engineers, 2013
4. Marine Boilers, G. T. H. Flanagan, Newnes Publication, 2013
5. Pounder's Marine Diesel Engines: and Gas Turbines, Doug Woodyard, Butterworth-Heinemann, 2013
6. Marine and Offshore Pumping and Piping Systems, J. Crawford, 2013

BMKV 4133
BUILDING SERVICES ENGINEERING/
KEJURUTERAAN PERKHIDMATAN BANGUNAN

LEARNING OUTCOME

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

1. Associate principle in HVAC, lift, escalator and conveyor systems with building design.
2. Demonstrate technical skills in the data collection and analysis of HVAC, lift, escalator and conveyor systems.
3. Debate building services knowledge and skills to monitor the systems, energy and efficiency of buildings.

SYNOPSIS

The aim of the building engineering services is to give students the opportunity to demonstrate their ability to develop a building project, from its preliminary design phase to construction planning through integrated teamwork. Student will be able to demonstrate his/her capability of to apply the latest technology in water supply system, heating, ventilation and air conditioning systems, security and fire alarm system, fire-fighting systems, lifts, escalators and other mechanical transport systems.

REFERENCES

1. Chadderton D.V., 2013, Building Services Engineering, 6th Edition, Routledge.
2. Greeno R. & Hall F., 2015, Building Services Handbook, Routledge.
3. Portman, J., 2014, Building Services Design Management, John Wiley

BMKV 4123
BUILDING UTILITIES/
UTILITI BANGUNAN

LEARNING OUTCOME

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

1. Associate principle and knowledge in building utilities with building design.
2. Demonstrate technical skills in the collection and analysis of building utilities data and propose solutions to implement in building utilities management policy.
3. Debate building utilities knowledge and skills to monitor the systems, energy and utilities efficiency of buildings.

SYNOPSIS

Principles and practices in water supply and sanitary systems. Pipe system of plumbing. Drainage in building. Electrical systems in buildings. Mechanical systems in buildings. Steam, air and gas distribution system in building; their measurement, analysis, design, installation, operation and maintenance in buildings in relation to the immediate surroundings or environment.

REFERENCES

1. Portman, Jackie (2014). Building Services Design Management. Oxford: UK: Wiley-Blackwell. ISBN 978- 1118528129.
2. Stipanuk, D. (2002), Hospitality Facilities Management and Design, (2nd ed.). New York: Cornell.
3. David V. Chadderton, (2007). Building Services Engineering, 5th ed. Taylor & Francis, Oxon.
4. G. J. Levermore (2000) Building Energy Management Systems, 2nd ed. E & FN Spon, (ISBN:9780419152903).
5. Keith Moss (2013) Heating and Water Services Design in Buildings, 2nd ed. Routledge ISBN 1134436009, 9781134436002

BMKV 4113
GREEN BUILDING AND SUSTAINABILITY/
KELESTARIAN DAN BANGUNAN HIJAU

LEARNING OUTCOME

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

1. Explain basic concepts related to sustainability & environmental concerns and describe major characteristics of sustainable buildings & infrastructures.
2. Demonstrate assessment techniques for green building delivery systems.
3. Share the philosophy of green building and sustainability.

SYNOPSIS

This course provides students with an understanding of the green building concept and assessment. The course covers the following topics:

- Ethics and sustainability; The green building concept; Environmental and resource concerns; Green building assessment; Conventional versus green building delivery systems; Green building process; Building materials and products; Construction operations; Building commissioning; Economic analysis of green buildings.

REFERENCES

1. Kibert, C.J., 2016, Sustainable Construction: Green Building Design Delivery, 4th Edition John Wiley.
2. Ching, F.D.K & Shapiro, I.M., 2014, Green Building Illustrated, John Wiley.
3. Chandrupatla, T.R. and Belegundu, A.D., 2012, Introduction to Finite Elements in Engineering, 4th Edition, Prentice Hall, New Jersey.
4. Reeder, L., 2010, Guide to Green Building Rating Systems: Understanding LEED, Green Globes, Energy Star, The National Green Building Standard and More, John Wiley.

BMKV 4143
BUILDING MAINTENANCE TECHNIQUE/
TEKNIK PENYELENGGARAAN BANGUNAN

LEARNING OUTCOME

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

1. Designate a structured and local approach to the formulation of an all embracing techniques for maintaining building.
2. Construct the most appropriate maintenance techniques based on the industry, configuration and operating context of the equipment.
3. Justify problem solving of real life condition regards to building maintenance issues.

SYNOPSIS

The students will be exposed to the various maintenance techniques from preventive maintenance, condition-based maintenance and run to fail maintenance technique for building. Principles of preventive maintenance; definition of a plant item; maintainability diagrams. Models for optimising the balance of preventive and corrective work. Definitions of operate to failure; fixed time maintenance; condition-based maintenance. Selection of the best maintenance procedure in the light of cost, safety factors and how the equipment fails. Assembling the maintenance tasks into a complete life plan for a unit or system. The top down and bottom-up approach to formulating a maintenance strategy. Using feedback to continuously improve the maintenance strategy. Industrial case studies.

REFERENCES

1. Tina Kanti Agustiady and Elizabeth A. Cudney,2015, Total Productive Maintenance: Strategies and Implementation Guide, CRC Press.
2. John D. Campbell and James V. Reyes-Picknell., 2015, Uptime: Strategies for Excellence in Maintenance Management, Productivity press.
3. Campbell, J. D., Jardine, A. K. S. and McGlynn, J., 2010, Asset Management Excellence: Optimizing Equipment Life-Cycle Decisions, 2nd Ed., CRC Press.

ACADEMIC HANDBOOK SESSION 2023/2024

FOR BACHELOR DEGREE PROGRAMMES

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ACADEMIC HANDBOOK SESSION 2023/2024
FOR BACHELOR DEGREE PROGRAMMES

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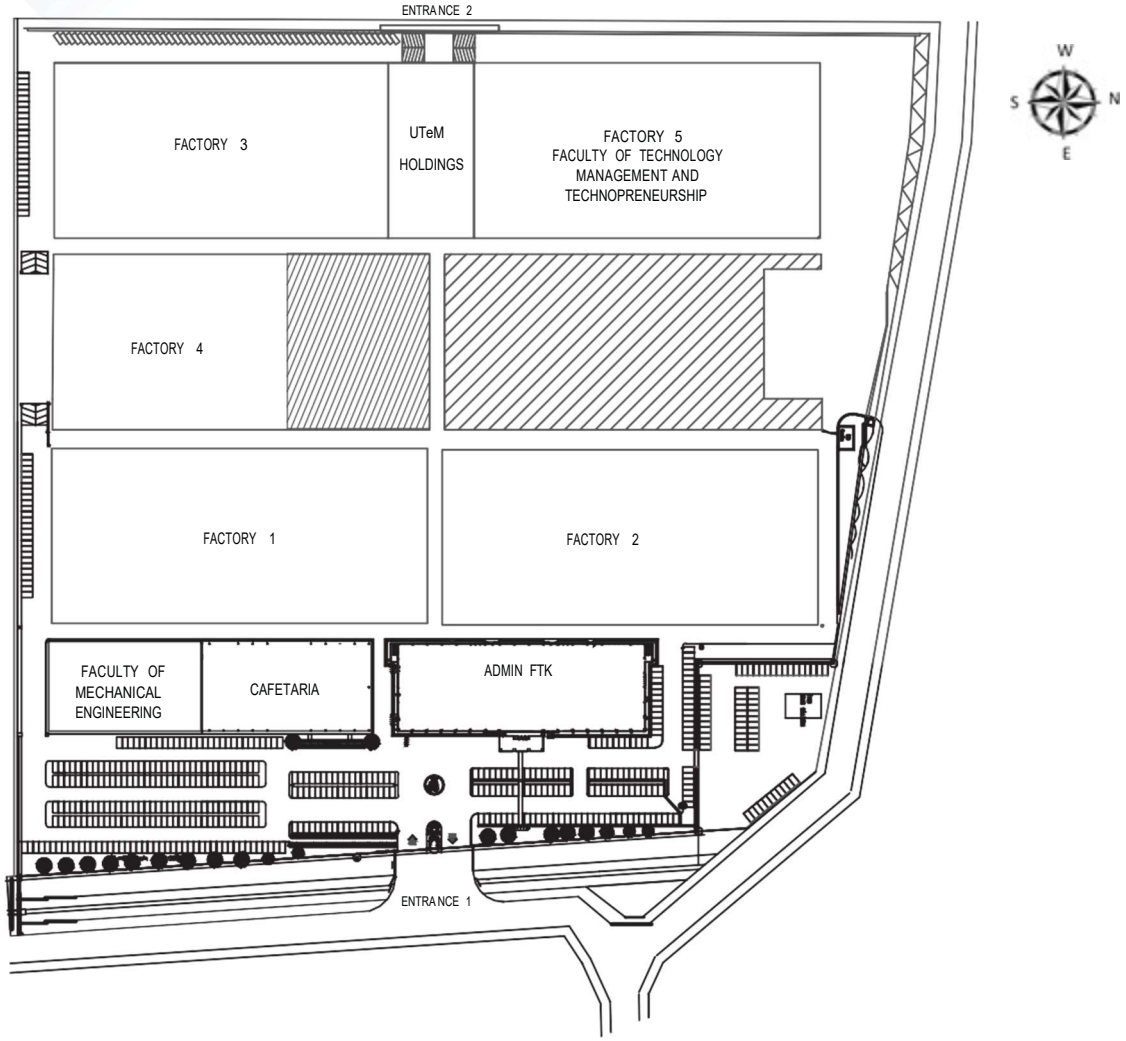
ENTRANCE 2
FACTORY 3
UTeM
HOLDINGS
FACTORY 5
FACULTY OF TECHNOLOGY
MANAGEMENT AND
TECHNOPRENEURSHIP
FACTORY 4
FACTORY 1
FACTORY 2
FACULTY OF
MECHANICAL
ENGINEERING
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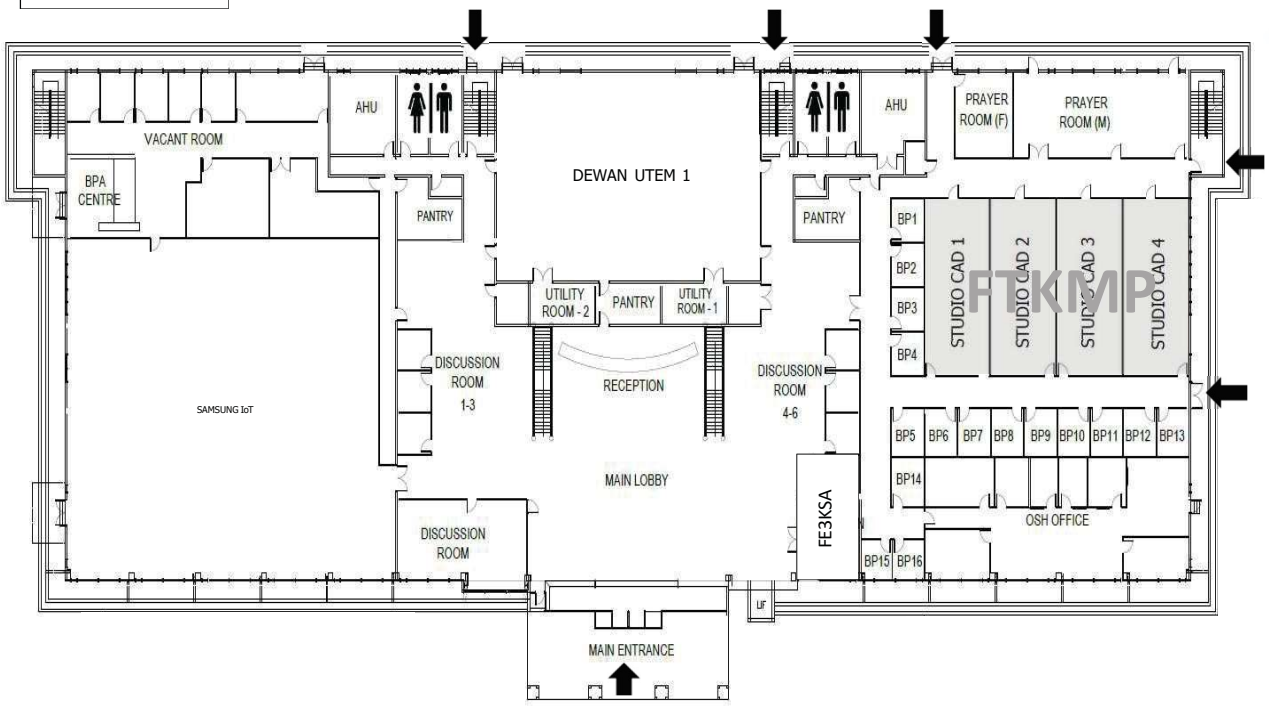
ADMIN-FTK (ARAS 1)



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➡ ENTRANCE TO BUILDING

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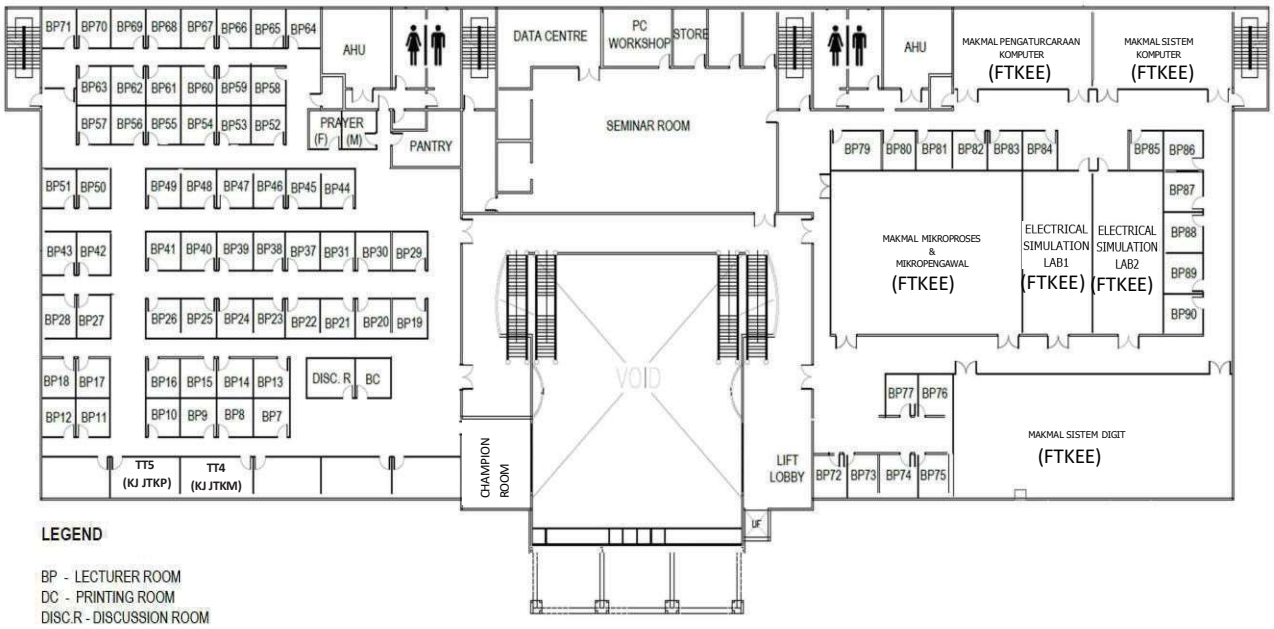

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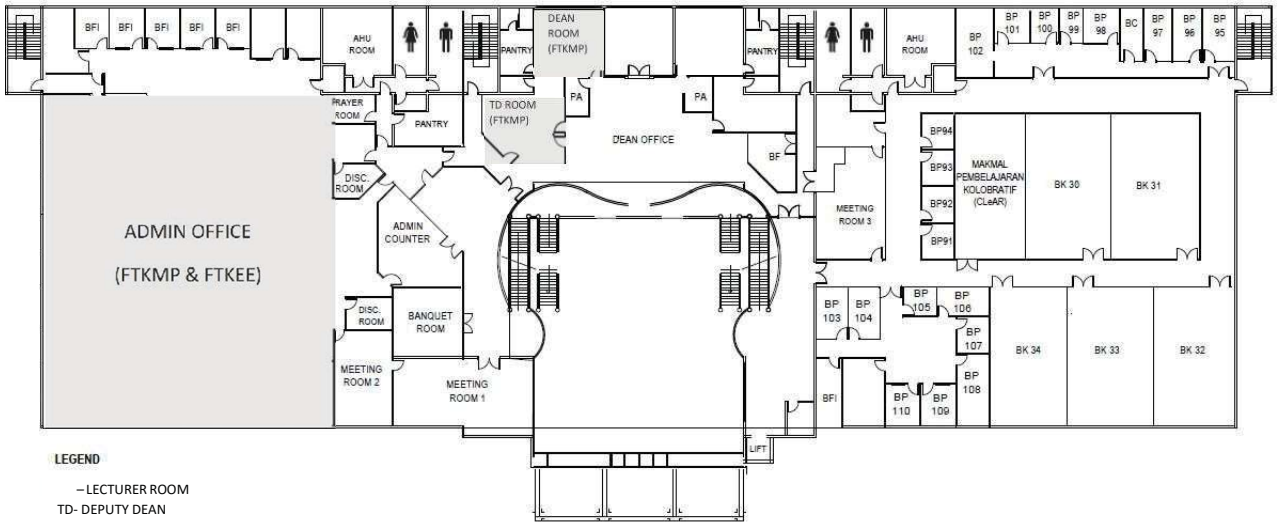

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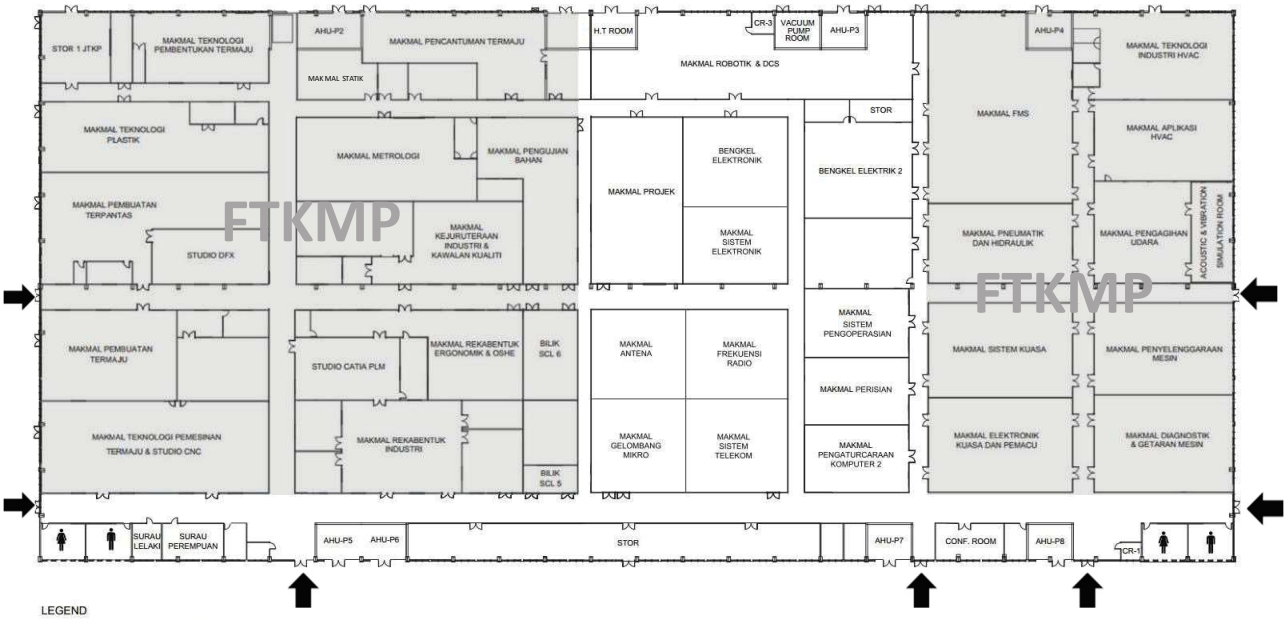
TD- DEPUTY DEAN

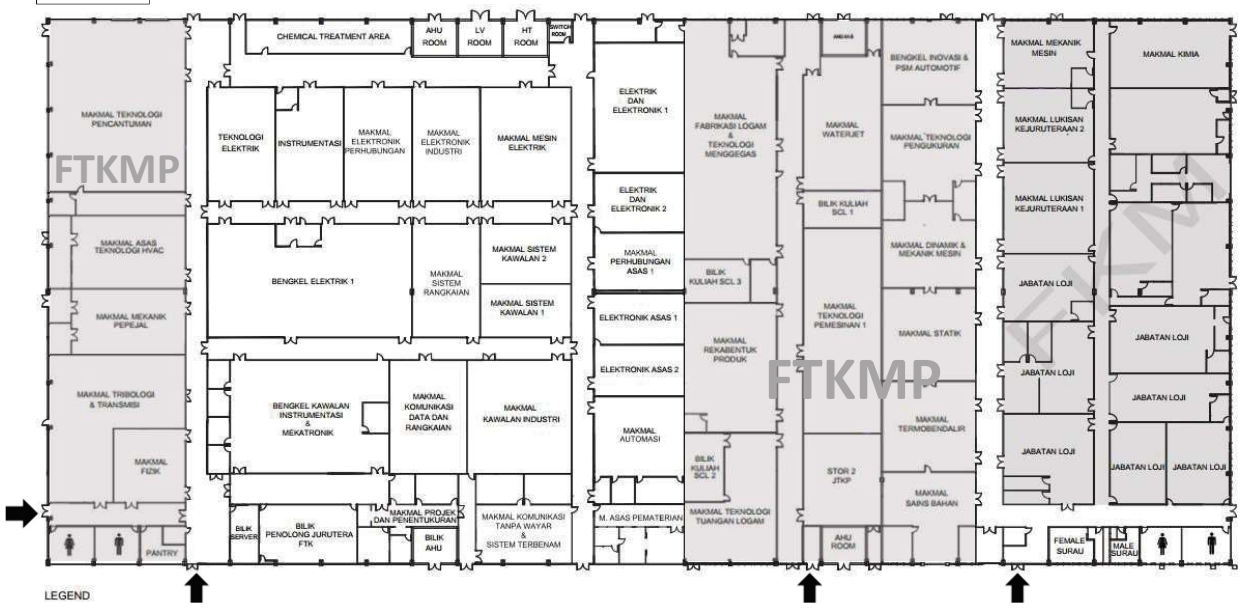
FACTORY 1



LEGEND

AHU - AIR HANDLING UNIT
SCL - STUDENT CENTRED LEARNING
HT - HIGH TENSION

FACTORY 2

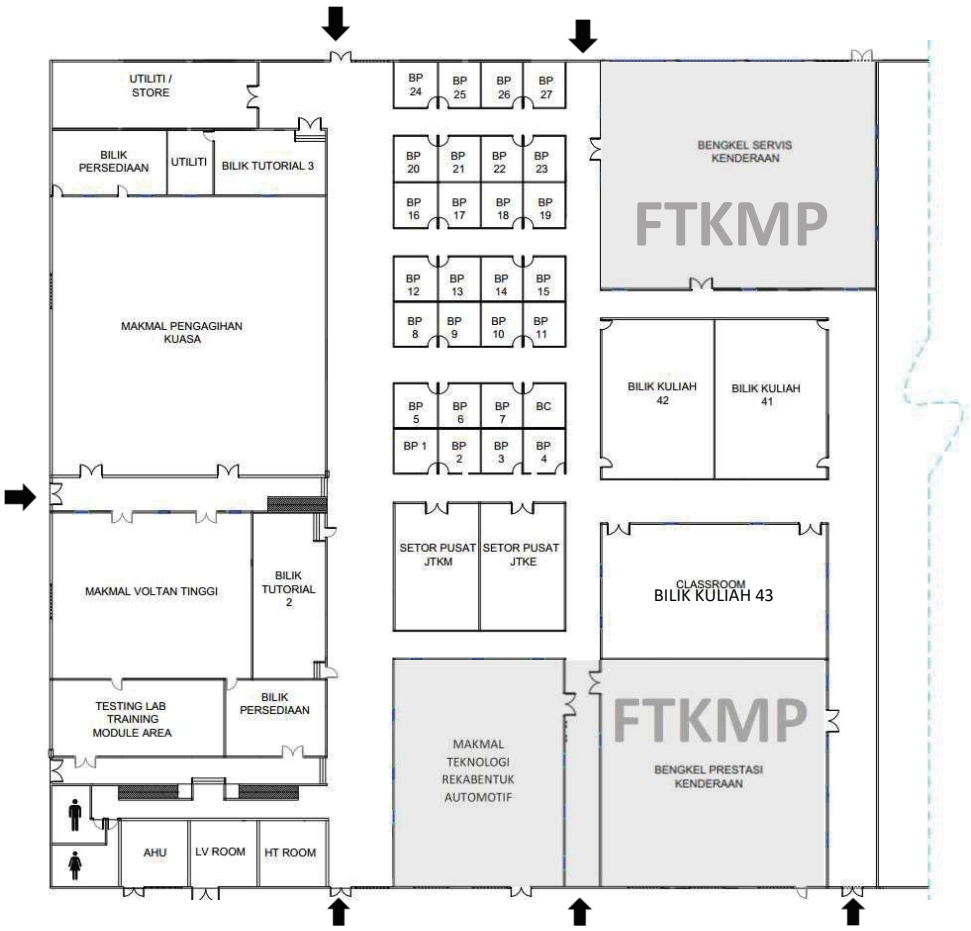


LEGEND

AHU - AIR HANDLING UNIT
SCL - STUDENT CENTRED LEARNING
HT - HIGH TENSION
LV - LIGHT VOLTAGE

FACTORY 3
ZON A
ZON B
ZON C
ZON D
ZON E
ZON F
ZON G
ZON H
ZON I
ZON J
UTeM HOLDING
MAKMAL PSM & INOVASI
MAKMAL TEKNOLOGI PERMESINAN 2
MAKMAL KOMPOSIT & RAWATAN PERMUKAAN
STOR PUSAT JTKP
MAKMAL KECEKAPAN TENAGA
MAKMAL KECERDIKAN TIRUAN
MAKMAL SISTEM KUASA LANJUTAN
MAKMAL PSM & PBL
STOR PUSAT JTKE
STOR PUSAT JTKM
STUDIO ANALISIS AUTOMOTIF
STUDIO CAD 5
STUDIO ANALISIS HVAC
MAKMAL PENYELENGGARAAN BANGUNAN
MAKMAL TENAGA TERBAHARU
MAKMAL PEMINDAHAN HABA HVAC
MAKMAL PENENTUKURAN & ANALISIS MINYAK
MAKMAL TEKNOLOGI AUTOTRONIK
BENGKEL INOVASI & PSM PENYELENGGARAAN
BENGKEL INOVASI & PSM HVAC
BILIK KULIAH 40
BILIK KULIAH 39
BILIK KULIAH 38
BILIK KULIAH 37
BILIK KULIAH 36
BILIK KULIAH 35

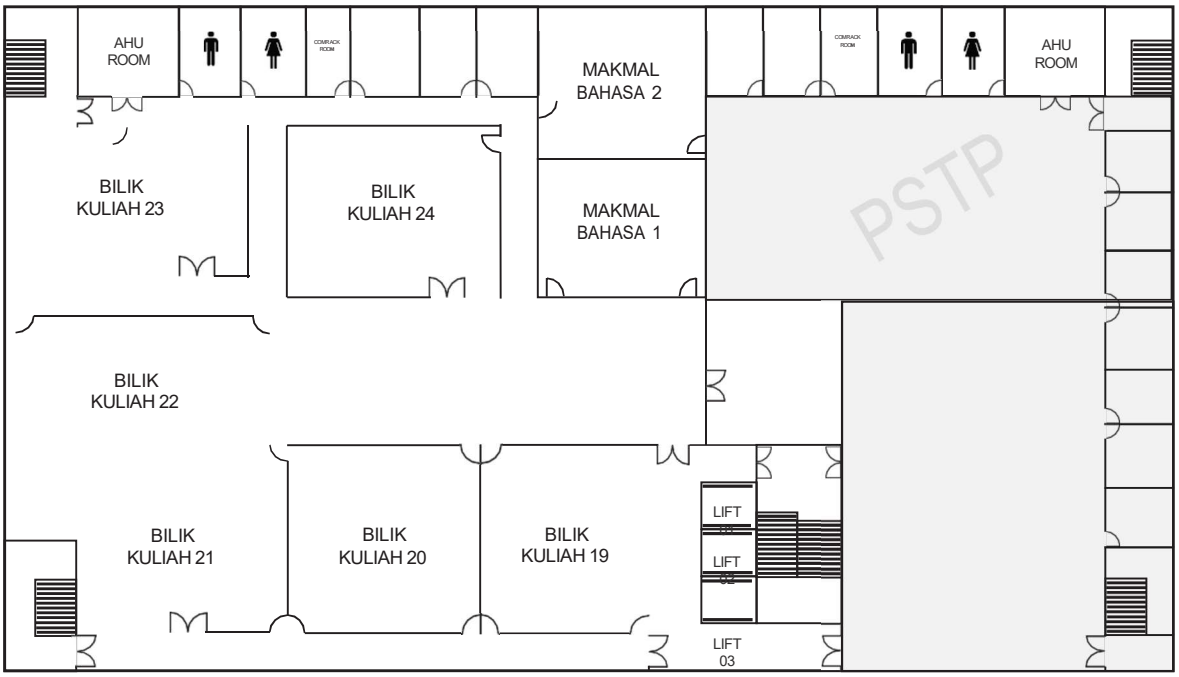
FACTORY4



LEGEND :

HT - HIGH TENSION
LV - LIGHT VOLTAGE
BC - BILIK COMRACK
BP - BILIK PENGAJAR

ARAS 5 (FKM BUILDING)



PETUNJUK:

PSTP - PUSAT SUMBER & TEKNOLOGI PENGAJARAN