UTeM
اونيۏرسيتي تيكنيکل مليسيا ملاک
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FTKIP
FAKULTI TEKNOLOGI DAN KEJURUTERAAN INDUSTRI DAN PEMBUATAN

FOR BACHELOR DEGREE PROGRAMMES

ACADEMIC HANDBOOK

2026-2027

FACULTY OF INDUSTRIAL AND MANUFACTURING TECHNOLOGY AND ENGINEERING

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ACADEMIC HANDBOOK 2026/2027

FOR BACHELOR DEGREE PROGRAMMES

Faculty of Industrial and Manufacturing Technology and Engineering
Universiti Teknikal Malaysia Melaka

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Contents

ABOUT

Universiti Teknikal Malaysia Melaka (UTeM) was established under Section 20 University and University College Act 1971 (Act 30) through "Perintah Universiti Teknikal Malaysia Melaka (Pemerbadanan 2007)" gazetted as P.U. (A) 43 on the 1st of February 2007. UTeM was initially known as Kolej Universiti Teknikal Kebangsaan Malaysia (KUTKM), established on the 1st of December 2001.

Vision

To be one of the world's leading innovative and creative technical universities.

Mission

UTeM is determined to lead and contribute to the wellbeing of the country and the world by:

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

TOP MANAGEMENT

PROFESSOR DATUK
TS. DR. MASSILA BINTI KAMALRUDIN
(VICE CHANCELLOR)

PROFESSOR
DR. MOHD RIZAL BIN SALLEH
DEPUTY VICE CHANCELLLOR
(ACADEMIC AND INTERNATIONAL)

PROFESSOR DR. ZAHRILADHA
BIN ZAKARIA
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(RESEARCH & INNOVATION)

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DEPUTY VICE CHANCELLLOR
(STUDENT AFFAIRS AND ALUMNI)

ASSOCIATE PROFESSOR
DR. MUSTHAFAH BIN MOHD TAHIR
ASSISTANT VICE CHANCELLOR
(STRATGIC & GLOBAL SUSTAINABILITY)

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(CHIEF OPERATING OFFICER)

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Chief Digital Officer

FOREWORD BY THE DEAN

Professor Ir. Dr. Mohd Asyadi ‘Azam bin Mohd Abid, PEng, CEng
Dean,
Faculty of Industrial and Manufacturing Technology and Engineering (FTKIP)

بسم الله الرحمن الرحيم

Assalamualaikum Warahmatullahi Wabarakatuh and Salam Sejahtera.
Dear Students,

It is my great pleasure to welcome you to the Faculty of Industrial and Manufacturing Technology and Engineering (FTKIP), Universiti Teknikal Malaysia Melaka (UTeM). Congratulations on embarking on an exciting academic journey that will equip you with the knowledge, skills, and innovative mindset required to thrive in an increasingly technology-driven and interconnected world.

Today, the industrial landscape is undergoing unprecedented transformation through the convergence of advanced manufacturing, artificial intelligence, automation, robotics, big data analytics, Industrial Internet of Things (IIoT), digital twins, and sustainable engineering practices. As industries worldwide transition towards Industry 4.0 and Industry 5.0, there is an increasing demand for engineers and technologists who can integrate technological innovation with human-centred and sustainable solutions.

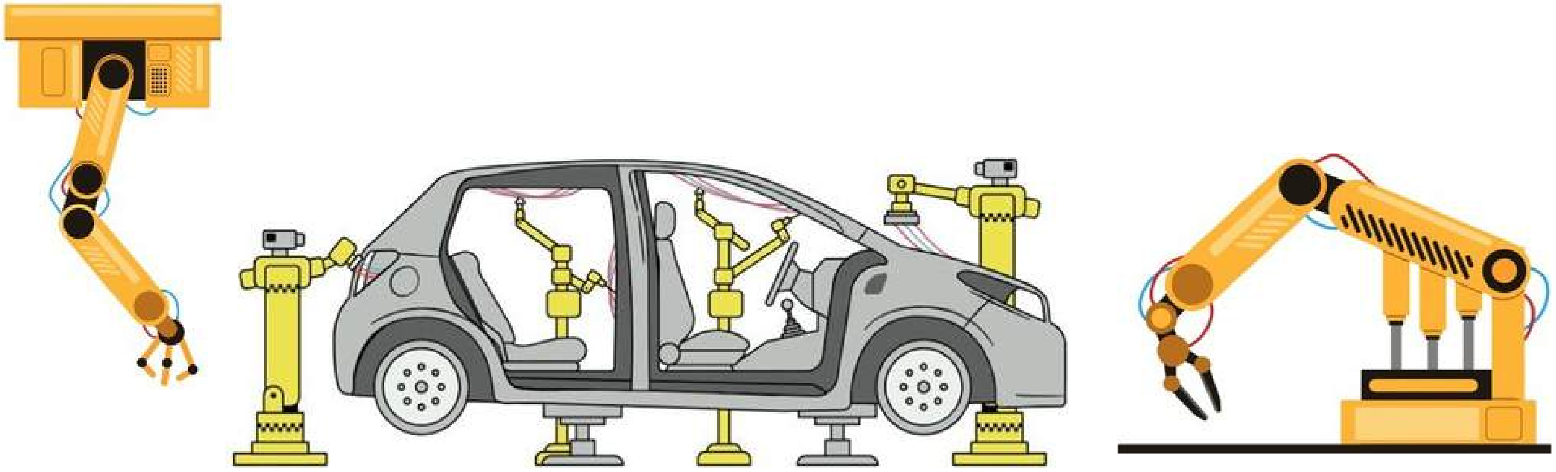
FTKIP stands uniquely positioned to prepare future-ready graduates for this evolving landscape. As the only faculty in Malaysia dedicated specifically to both Industrial Engineering and Manufacturing Technology and Engineering, we offer a distinctive educational experience that bridges engineering principles, advanced manufacturing technologies, digitalisation, and industrial sustainability. Our programmes are designed in close collaboration with industry to ensure graduates possess the competencies required to address real-world challenges and contribute meaningfully to national and global development.

This handbook has been prepared as a valuable guide to support your academic journey. It provides important information on curriculum structure, academic regulations, student development opportunities, and support services available throughout your studies. I encourage you to familiarise yourself with its contents and make full use of the resources provided.

As you begin this new chapter, I encourage you to embrace every opportunity to learn, innovate, collaborate, and grow. The knowledge and experiences gained at FTKIP will serve as a strong foundation for your future contributions towards advancing industry, technology, sustainability, and society. I wish you every success in your studies and future endeavours.

Thank you.

INTRODUCTION TO MANUFACTURING ENGINEERING & INDUSTRIAL ENGINEERING



Manufacturing engineering is a branch of engineering that focuses on designing and operating manufacturing systems for products. It deals with understanding, analysing, and improving complex industrial, manufacturing, and infrastructure systems. This discipline emphasizes identifying and utilizing the right equipment to transform raw materials such as metal, plastic, or wood into finished products in the most efficient way possible. The process begins with product design, then advances to development and production, while also involving the selection of the most suitable technologies and processes.

As Malaysia is a manufacturing-driven nation, continuous innovation is essential to grow markets and deliver improved products. Over the years, Malaysia has strengthened its manufacturing sector, establishing itself as a significant global player. This progress aligns directly with the Sustainable Development Goals (SDGs), particularly SDG 9 (Industry, Innovation, and Infrastructure), as the nation's manufacturing base relies heavily on advanced systems and innovative practices to remain competitive worldwide.

The rise of Industrial Revolution 4.0 (IR4.0) has transformed the way industries operate. Incorporating technologies such as the Internet of Things (IoT), cyber-physical systems (CPS), cloud computing, artificial intelligence (AI), 3D printing, predictive maintenance, and smart sensors, IR4.0

drives automation and smarter data exchange. These advancements not only boost productivity and efficiency but also support SDG 12 (Responsible Consumption and Production) by reducing waste, optimizing resources, and enabling sustainable manufacturing practices. In addition, renewable-powered factories and energy-efficient systems strengthen SDG 7 (Affordable and Clean Energy) by reducing dependence on fossil fuels and promoting greener operations. Cleaner production methods, water recycling, and pollution control also address SDG 6 (Clean Water and Sanitation) by protecting water resources within industrial processes.

Altogether, the integration of IR4.0 provides remarkable opportunities for Malaysia's manufacturing sector. It enhances productivity, reduces costs, and promotes sustainability, ensuring that industrial progress contributes not only to economic growth but also to environmental responsibility and societal well-being.

INDUSTRIAL & MANUFACTURING ENGINEERING CAREER

Process Engineer Design
Engineer Automation Engineer
Material Engineer Quality
Control Engineer
Manufacturing Technologist
CAM Programmer Operation
Manager
Supply Chain Analyst
Lead Engineer Production
Technologist Industrial
Designer Packaging Engineer

Aerospace Automotive
Internet of Things (IoT)
Manufacturing
Oil and gas
Automation & Control
Pharmaceutical
Plant and machinery
manufacture Food &
Beverage Biotechnology

Programmes Offered by Faculty of Industrial and Manufacturing Technology and Engineering (FTKIP)

Undergraduate Programmes

Engineering
- Bachelor of Manufacturing Engineering with Honours (BMIG)
- Bachelor of Manufacturing Engineering with Honours (BMIG - Part Time)
- Bachelor of Industrial Engineering with Honours (BMIF)

Engineering Technology
- Bachelor of Manufacturing Engineering Technology (Product Design) with Honours (BMID)
- Bachelor of Manufacturing Engineering Technology (Process and Technology) with Honours (BMIP)
- Bachelor of Manufacturing Engineering Technology with Honours (BMIW)

Technology
- Bachelor of Technology in Industrial Machining with Honours (BMIM)
- Bachelor of Technology in Welding with Honours (BMIK)

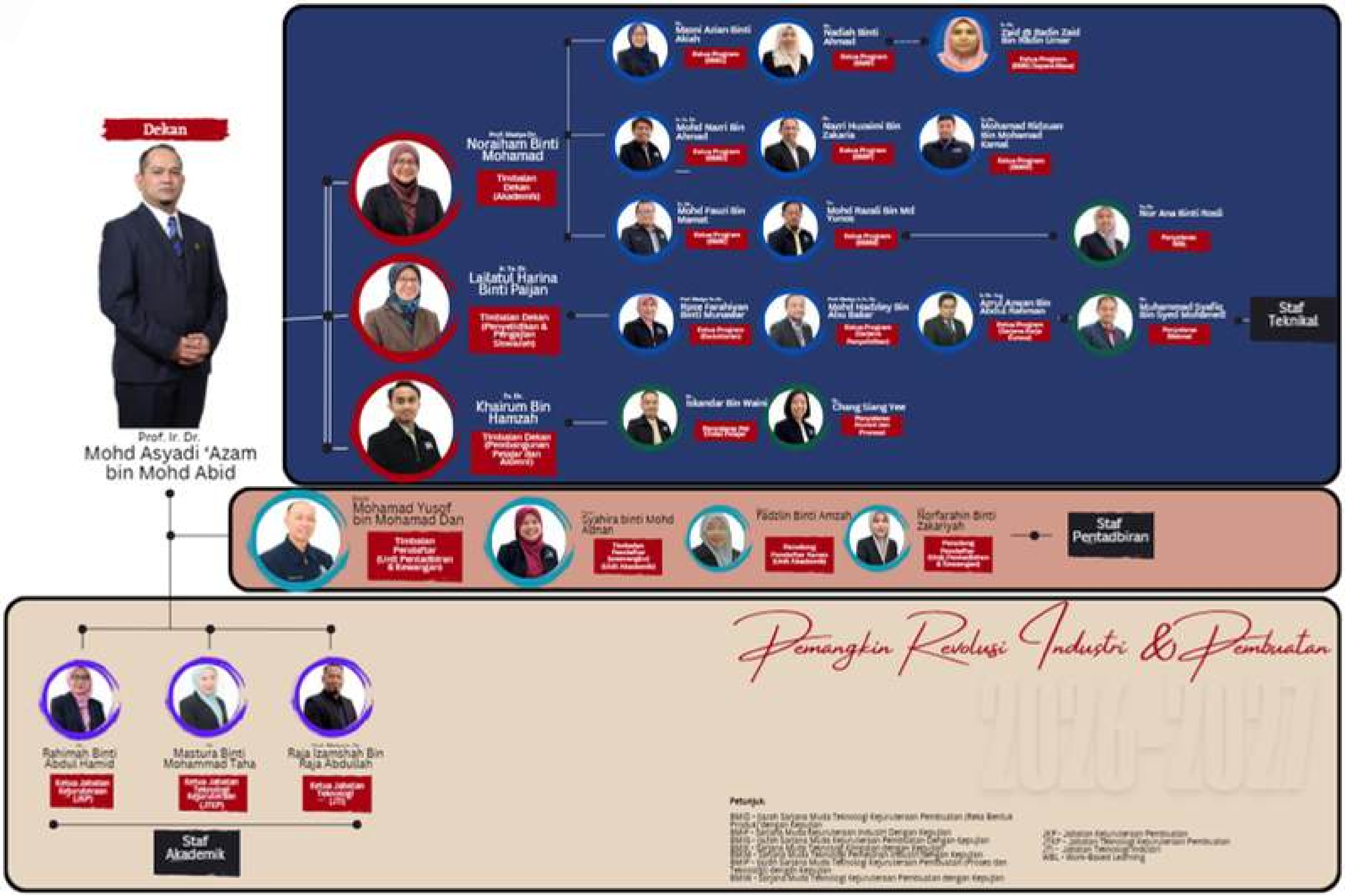
Postgraduate Programmes

Doctorate
- Doctor of Philosophy (PhD)
- Doctor of Engineering (D.Eng.)

Masters by Research Course
- Master of Engineering in Manufacturing Engineering (MSc.)

Masters by Coursework
- Manufacturing Systems (MMFS)
- Industrial Engineering (MMFD)
- Quality Systems (MMFQ)
- Advanced Materials and Processing (MMFB)

ORGANISATION OF FACULTY



ACCREDITATION

Accreditations for undergraduate academic programs in the Faculty of Manufacturing Engineering, both for Degree and Diploma programs, are conducted by the registered councils and agency to uphold the highest quality of engineering education. The Bachelor of Manufacturing Engineering and Bachelor of Industrial Manufacturing are accredited by the Engineering Accreditation Council (EAC). While the Bachelor of Manufacturing Engineering Technology is accredited by the Malaysian Qualification Agency (MQA) and Engineering Technology Accreditation Council (ETAC). For Bachelor of Technology, the program recently under evaluation by the Malaysia Board of Technologists (MBOT). Meanwhile, the Diploma of Manufacturing Engineering is continuing to achieve the standard set by the Malaysian Qualification Agency (MQA) since 2011. The following indicates the program's accreditation in the Faculty of Industrial and Manufacturing Technology and Engineering (FTKIP).

Academic Program	Accreditation Body	Accreditation
Bachelor of Manufacturing Engineering with Honours	MQA / EAC	2024 - 2029
Bachelor of Manufacturing Engineering with Honours (Part time)	MQA / EAC	
Bachelor of Industrial Engineering with Honours	MQA / EAC	2023 - 2028
Bachelor of Manufacturing Engineering Technology (Process and Technology) with Honours	MQA/ ETAC	2021 - 2026
Bachelor of Manufacturing Engineering Technology (Product Design) with Honours	MQA/ ETAC	2021 - 2026
Bachelor of Manufacturing Engineering Technology	MQA/ ETAC	2021 - 2026
Bachelor of Technology in Welding with Honours	MBOT	2023 - 2026
Bachelor of Technology in Industrial Machining with Honours	MBOT	2023 - 2026

Graduates from accredited engineering programs (EAC) can register as Graduate Engineers with BEM and apply for IEM membership.

Graduates from engineering technology programs (ETAC) can register as Graduate Engineering Technologists with BEM.

Graduates from technology programs(MBOT) can register as Graduate Technologists with MBOT.

Besides teaching activities, FTKIP is also actively engaged in research. The Research Group (RG) serves as a platform to strengthen research activities and foster industrial-driven research among FTKIP staff.

The Centre of Smart System and Innovative Design (CoSSID), established on 13th June 2019, serves as a platform for advancing research and innovation in line with FTKIP's research focus. CoSSID emphasizes smart manufacturing systems and innovative design, with its main role in driving research across design, materials, processes, system integration, and operational sustainability. The centre delivers innovative manufacturing solutions through Computer Aided Engineering (CAE), Reverse Engineering, Material Innovation, Digital Manufacturing, Additive Manufacturing/3D Printing, Precision Machining, Smart System Automation, and Operational Research, contributing towards innovation, smart industries, and sustainable infrastructure (SDG).

VISION

- To be a referred Centre of Excellence for Smart System and Innovative Design in the field of manufacturing.
- To enhance knowledge and expertise in the smart manufacturing process, intelligent system and innovative product design through research and development.
- To provide smart solution via translational research for the betterment of humankind.
- To strengthen the collaboration among the academia, industries and communities through smart partnership.

RESEARCH GROUP

Forecasting and Engineering Technology Analysis
Data Modeling and Forecasting for Engineering Technology

Smart Materials
Green, Sustainable & Nano- Materials Engineering and Technology for Smart Manufacturing

Sustainable and Responsive Manufacturing
Green Responsible Consumption and Production

Forecasting and Engineering Technology Analysis
Ergonomics Assessment (Product and Service) / Kansei Engineering (Product and Service) / Autonomous Mobile

Innovative Design, Joining and Forming
Innovative Design, Joining & Forming / 3D Scan, 3D Digital Design, 3D Thermal, 3D Fluid Structure Interaction (FSI) and 3D Optimisation

Smart Factory System
Cyber Physical System, Cloud Manufacturing, Industrial Robot and IoT for Smart Manufacturing / Lean and Integrated Industrial System Investigation and Solution

Additive Manufacturing Research Group *3D Printing, 4D Printing / Advanced Process, System, Materials and Technology for Additive Manufacturing*

Advanced Machining Group
Precision Machining and Manufacturing (Subtractive Process)

Excellence for Smart System & Innovative Design

ACADEMIC SYSTEM

UTeM practices a semester academic system. Every academic year comprises two semesters and in some instances the faculty also offers special semesters, which are arranged during the semester break. There are **18 weeks of study week,** which include 7 weeks of first part lecture, followed by 1-week mid-semester break. Students will continue another 7-week second-part lecture before 1 week of study leave and 2 weeks for the final examination.

The learning process at UTeM includes **lectures, tutorials, written assignments, practicals, laboratories, and projects,** which will be done either by individuals or by group work. A bachelor's degree student must fulfill all credit hours required to graduate within 8 - 12 semesters, while a Diploma student must do so between 6 – 10 semesters to graduate.

ENTRY REQUIREMENTS

Bachelor Degree (Engineering Programme)

DIPLOMA HOLDERS/ EQUIVALENT	MATRICULATION CERTIFICATE	STPM HOLDERS
General Requirements: • Pass SPM / equivalent with credit (Grade C) in Bahasa Melayu/ Bahasa Malaysia or credit (Grade C) in Bahasa Melayu/Bahasa Malaysia July Examination and pass Sejarah (for SPM 2013 onwards; **AND** • Pass Diploma / equivalent qualification recognized by the Government of Malaysia and approved by the University Senate; **AND** • A minimum of Band 2 in Malaysian University English Test (MUET).	*General Requirements:* • Pass SPM / equivalent with credit (Grade C) in Bahasa Melayu/ Bahasa Malaysia or credit (Grade C) in Bahasa Melayu/Bahasa Malaysia July Examination and pass Sejarah (for SPM 2013 onwards); **AND** • Pass KPM Matriculation / Asasi with at least a CGPA of 2.00; **AND** • A minimum of Band 2 in Malaysian University English Test (MUET).	*General Requirements:* • Pass SPM / equivalent with credit (Grade C) in Bahasa Melayu/ Bahasa Malaysia or credit (Grade C) in Bahasa Melayu/Bahasa Malaysia July Examination and pass Sejarah (for SPM 2013 onwards); **AND** • Pass STPM (non-current year) with a minimum CGPA of 2.00 and at least Grade C (CGPA 2.00) in three (3) subjects including the General Paper**; AND** • A minimum of Band 2.0 in the Malaysian University English Test (MUET).
Program's Special Requirements: • Pass a Diploma in relevant field (Engineering Technology) with at least a CGPA of 3.00 or Diploma in Engineering with at least a CGPA of 2.75, recognized by the Government of Malaysia and approved by the University Senate **AND** • Credit exemptions are subject to the faculty's approval **AND** • Pass the Diploma program before the academic session begins; **AND** • Candidates must not have any physical disabilities or impairments that may affect their ability to carry out practical or laboratory work.	*Program's Special Requirements:* • Pass with at least Grade C (2.00) in Mathematics/ Engineering Mathematics, Physics/ Engineering Science and Chemistry/ Basic Engineering; **AND** • Candidates must not have any physical disabilities or impairments that may affect their ability to carry out practical or laboratory work.	*Program's Special Requirements:* • Pass with at least Grade C (2.00) in General Paper, Mathematics, Physics, and Chemistry; **AND** • Candidates must not have any physical disabilities or impairments that may affect their ability to carry out practical or laboratory work.

ENTRY REQUIREMENTS

Bachelor Degree (Engineering Technology Programme)

DIPLOMA HOLDERS/ EQUIVALENT	MATRICULATION CERTIFICATE	STPM HOLDERS
General Requirements: • Pass SPM / equivalent with credit in (Grade C) Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/Bahasa Malaysia July Examination and passed Sejarah (for SPM 2013 and above) in SPM; **AND** • Pass Diploma / equivalent qualification recognized by the Government of Malaysia and approved by the University Senate; **AND** • A minimum of Band 2 in Malaysian University English Test (MUET).	*General Requirements:* • Pass SPM / equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/Bahasa Malaysia July Examination and passed Sejarah (for SPM 2013 and above) in SPM; **AND** • Pass KPM Matriculation / Asasi with at least a CGPA of 2.00; **AND** • A minimum of Band 2 in Malaysian University English Test (MUET).	*General Requirements:* • Pass SPM / equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/Bahasa Malaysia July Examination; **AND** • Pass STPM with at least Grade C (CGPA 2.00) in the General Paper **AND** • A minimum of Band 2 in Malaysian University English Test (MUET).
Program's Special Requirements: • Pass a Diploma in Engineering with at least a CGPA of 2.00 or Diploma in Engineering Technology with at least a CGPA of 2.30 or Malaysian Skills Diploma (DKM), Malaysian Advanced Skills Diploma (DLKM), with at least a CGPA 2.75/ 80% marks and above from Skills Development Department (JPK) recognized by the Government of Malaysia and approved by the University Senate **AND** • Credit exemptions are subject to the faculty's approval **AND** • Pass the Diploma program before the academic session begins. • Candidates do **NOT** have physical disabilities / limbs that make practical work difficult.	*Program's Special Requirements:* • Pass with at least Grade C (2.00) in each of the subject; Mathematics and Physics/ Chemistry/ Biology/ Mechanical Engineering/ Electrical & Electronic Engineering/ Civil Engineering/ Basic Engineering • Candidates with Biology must get at least Honors (Grade C) in Physics subjects ranked in the Malaysian Certificate of Education (SPM)	*Program's Special Requirements:* • Pass with at least Grade C (2.00) in Mathematics, Physics, and Chemistry.

ENTRY REQUIREMENTS
Bachelor Degree (Technology Programme)

DIPLOMA HOLDERS/ EQUIVALENT
General Requirements: • Acquire a Malaysian Skills Diploma (DKM), Malaysian Advanced Skills Diploma (DLKM), or Malaysian Vocational Diploma (DVM) designated equivalent by the Malaysian Government and approved by the University Senate.; AND
Program's Special Requirements: • Pass a Diploma in Technology from Vocational College under the Malaysian Ministry of Education, with at least a CGPA of 2.00 in a recognized related field and received approval of the University Senate is necessary; **OR** • Pass a Malaysian Skills Diploma (DKM)/ Malaysian Advanced Skills Diploma (DLKM) from Skills Development Department (JPK) under the Ministry of Human Resources by obtaining at least a CGPA 2.00 in a recognized related filed and obtaining the approval of University Senate. **AND** • Have passes/ completed studies at the Diploma level before the application closing date; **AND** • Candidates do **NOT** have physical disabilities / limbs that make practical work difficult; **AND** • Admission is for Year 1 only without credit exemption.

Definition of Course Categories

UNIVERSITY COMPULSORY COURSES (W)

These courses are determined by the University and are compulsory for all students.

PROGRAMME CORE COURSES (P)

These courses are determined by the University and the Faculty and are compulsory for all engineering students.

COURSE CORE (K)

These courses are determined by the Faculty and are compulsory for all engineering students enrolled in the program.

ELECTIVE COURSES (E)

These courses are determined by the Faculty and are compulsory for all students specialising in respected fields.

Definition of Credit Hour

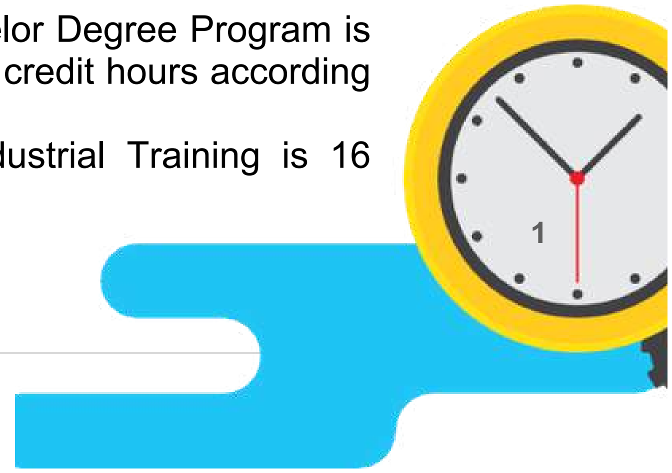
CREDIT SYSTEM FOR COURSES

In the semester system, each subject is given credit values except for Courses, which are determined by the University. Each subject is given credit to show the importance of the contents. The amount of credit represents the effort expected to be performed by students. As a result, students should wisely allocate their study time based on the credit of the Courses.

CREDIT SYSTEM INDUSTRIAL TRAINING

The duration of Industrial Training for Bachelor Degree Program is 10 weeks to 12 months for a total of 5 to 12 credit hours according to the program.

For Diploma Program, the duration of Industrial Training is 16 weeks for a total of 8 credits hours.



Student Learning Time (SLT)

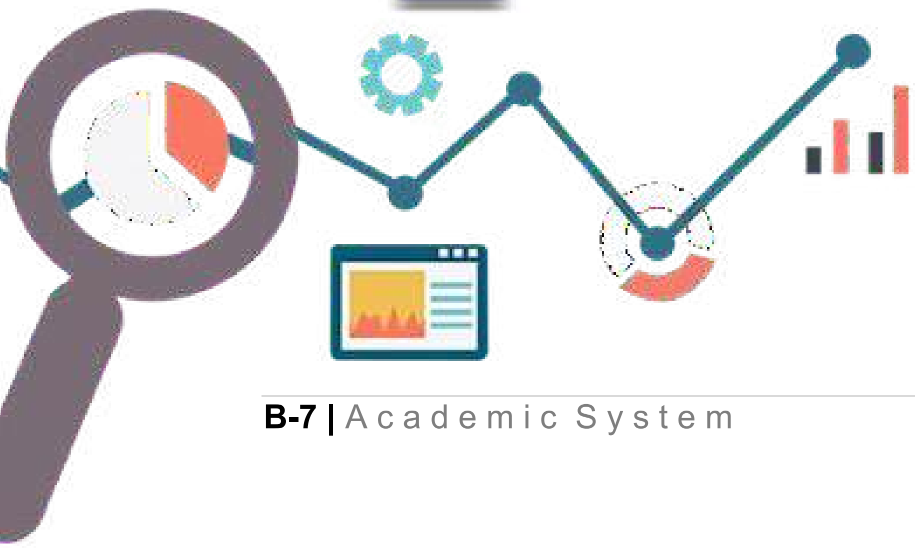
Student Learning Time (SLT) is the average number of hours expected of a student to allocate for a given credit hour in a semester. Learning time is computed for guided learning session, independent learning session, and preparation for course assessment.

GUIDED LEARNING • Lecture • Tutorial • Practical • Others • (Project, Problem-Based Learning, Assignment)	• 1 hour per credit per week • 2 hours per credit per week • 2-3 hours er credit per week • 3 hours per credit per week, distributed accordingly.
INDEPENDENT LEARNING • Preparation for lecture • Preparation for tutorial • Preparation for practical • Other Preparations (Project, Problem-Based Learning, Assignment) • Final Exam • Test • Coursework / Assignment • Others	• 0.5 - 1 hour per lecture session • 0.5 - 1 hour per tutorial session • 0.5 - 1 hour per practical session • 3 hours per credit per week, distributed accordingly. • ~ 4 minutes for each assessment minute. • ~ 4 minutes for each assessment minute. • ~ 4 minutes for each assessment minute. • ~ 4 minutes for each assessment minute.
ASSESSMENT • Final Exam • Test • Assignment • Others	• ~ 1 minute per unit marks per credit • ~ 1 minute per unit marks per credit • ~ 1 minute per unit marks per credit • ~ 1 minute per unit marks per credit
CREDIT PER SEMESTER	• **18 credits (maximum)** • **12 credits (minimum)** • **22 credits (with Dean'spermission)**

Grading System

The following shows the grading system adopted by the university.

Marks	Grades	Grade Point Value Marks	Grade Point Value Achievement
80-100	A	4.0	Distinction
75-79	A-	3.7	Distinction
70-74	B+	3.3	Credit
65-69	B	3.0	Credit
60-64	B-	2.7	Pass
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
00-39	E	0.0	Fail



Academic Achievement

Grading Point

Grade Point Average (GPA) is a grade point average earned by a student in a semester.

• Total Grade Point (JMN)	$= k_1m_1 + k_2m_2 + \cdots + knmn$
• Total Calculated Point (JKK)	$= k_1 + k_2 + \cdots + kn$
• Grade Point Average (GPA)	$= \dfrac{JMN}{JKK}$

Where
k = credit hour for subject
m = grade points earned for subject
n = number of courses registered

Average Calculation

Cumulative Grade Point Average (CGPA) is a grade point average earned by a student inclusive all semesters he/she registers.

• CGPA	$= \dfrac{JMN_1 + JMN_2 + \cdots + JMNn}{JKK_1 + JKK_2 + \cdots + JKKn}$

Academic Standing

The academic standing for each student is determined by the examination results obtained at the end of every semester. The status is categorized as shown.

Good Standing / Kedudukan Baik	**CGPA ≥ 2.00**
Conditional Status / Kedudukan Bersyarat (KS)	**1.70 ≤ CGPA < 2.00**
Fail / Kedudukan Gagal	**CGPA < 1.70**

① Subject to the approval of Senate, a student who obtains **CGPA ≥ 2.00 but GPA < 1.00** may;

(i) be allowed to continue his studies with **KB**; or

(ii) be directed to postpone his studies in the next semester with **KB**; or

(iii) Be dismissed from his studies with **KG**.

② Subject to the approval of the Senate, a student who obtains **1.70 ≤ CGPA < 2.00 but GPA <1.00** may;

(i) Be directed to postpone his studies in the next semester with **KS**; or

(ii) Be dismissed from his studies with **KG**.

③ The Academic Standing of a student in a Special Semester shall not be determined. Grades obtained in the Special Semester shall be counted when calculating the CGPA for the subsequent semester. However, CGPA will be determined for a student who is due to graduate in the Special Semester based on the Repeat/Redeem Course.

④ A student who obtains **KS** status for three (3) consecutive semesters shall be given **KG** status.

⑤ A student who obtains a **KG** shall be dismissed from his studies.

⑥ For students with **KS**, maximum permissible credit for the upcoming semester is 12 credits.

Graduation Requirement

A student shall only be conferred a Bachelor Degree or Diploma subject to the following conditions: -

a. The student must obtain a Good Academic Standing (KB) in his final semester.
b. The student must pass all Courses required by the curriculum.
c. Any other conditions set by the University.
d. The **Good Academic Standing Award (KBA)** shall be given to students who have fulfilled the conditions of all above.
e. Bachelor Degree students must take the professional certification to meet the graduation requirement.

Academic Advisory System

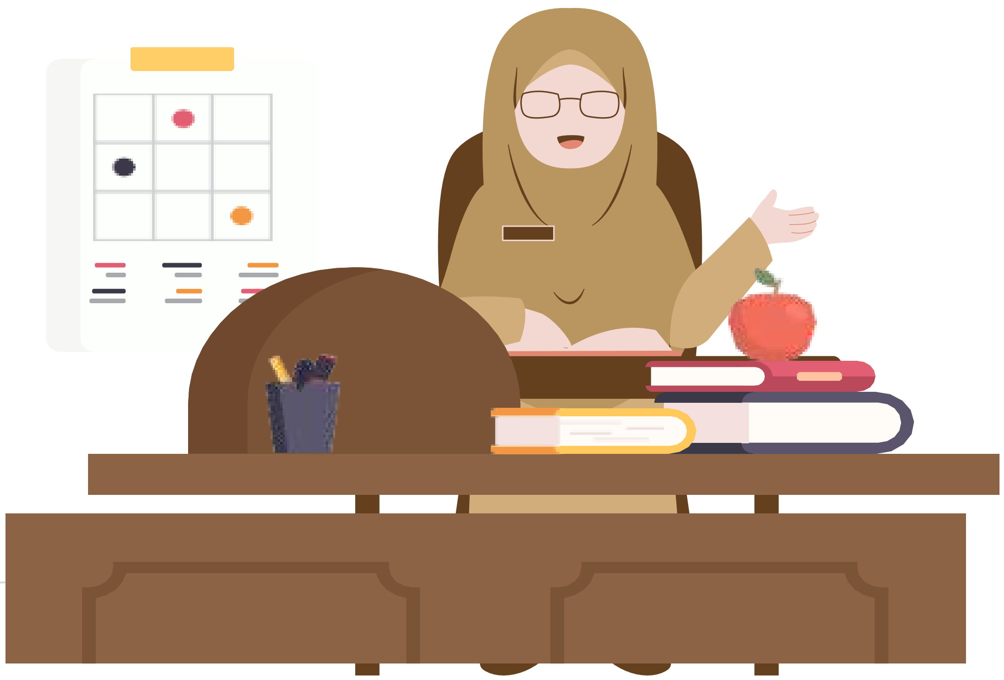
Students are free to take courses offered by the faculty at any semester based on their capability,as long as it complies with the rules and regulations set up by the faculty and university academic board. Students need to plan their own study carefully and the faculty shall appoint an academicadvisor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

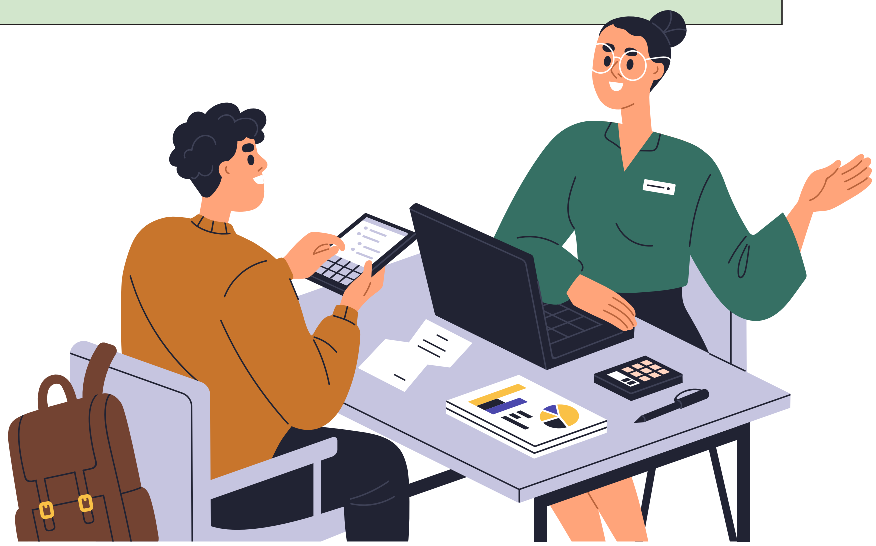
The Importance of Academic Advisor:

- Students need to be guided in terms of courses taken under the semester system, where theyare 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 plancarefully to take courses which are suitable for them to carry and fully aware of its implicationto 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 studyperiod set up by the university.
- The academic advisor can provide advice not only on academic matters, 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 thestudents' 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/herto discuss the matter of study with the others. Therefore, the role of academic advisors is important.

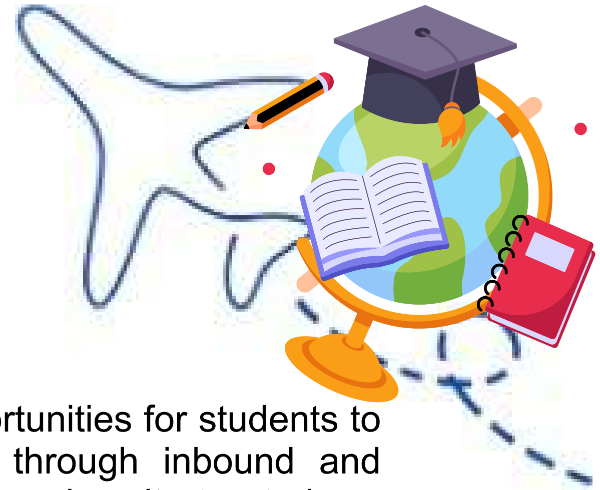


Roles and Responsibilities of student and academic advisor in the Academic Advisory System are as follows:

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 students 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 academic matters from them.
• Supervise the student's study progress andprovide 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 bemotivated 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 courses 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.



Academic Mobility



The student mobility program is an academic initiative that provides opportunities for students to gain international exposure and broaden their learning experiences through inbound and outbound activities. **Outbound mobility** allows students from the home university to study or participate in programs at partner institutions **abroad**, while **inbound mobility** welcomes students from partner institutions to the **home** university. These programs may be conducted with credit transfer, where courses taken abroad are officially recognized toward the student's degree, or without credit transfer, involving activities such as short courses, summer schools, cultural exchanges or research attachments that enhance personal and professional growth. To participate in the mobility program, students are generally required to maintain a minimum CGPA of **3.0 and above**, ensuring academic readiness and commitment to representing the university abroad.

Germany
- Hochschule Hannover University of Applied Sciences and Arts

Indonesia
- Universitas Trisakti
- Universitas Mulawarman
- Universitas Negeri Malang
- Universitas Ahmad Dahlan
- Institut Teknologi Kalimantan
- Institut Teknologi Sepuluh Nopember
- Universitas Merdeka Malang

China
- Hunan Institute of Technology
- Zhejiang University of Technology (ZJUT)

Japan
- University of Tokushima
- Shibaura Institute of Technology
- Nagaoka University of Technology
- Japan Advanced Institute of Science and Technology
- Otemon Gakuin University

SECTION D

PROGRAMME DETAILS

OUTCOME BASED EDUCATION

The Washington Accord (WA), under the International Engineering Alliance (IEA), is an international agreement among countries to acknowledge the substantial equivalency of accredited engineering programs, in which Malaysia is recognized as a provisional signatory. Under this accord, graduates of accredited engineering programs in member countries are considered to have met the academic requirements for entry into engineering practice across all signatory nations.

The Sydney Accord, Dublin Accord, and Seoul Accord complement the WA by providing recognition of qualifications for engineering technologists, engineering technicians, and computing professionals. Collectively, these accords promote international mobility and global acceptance of graduates' qualifications. All accords, including the WA, have adopted Outcome Based Education (OBE) as the core teaching and learning paradigm, emphasizing curriculum design, assessment, and reporting that focus on higher-order learning outcomes and mastery rather than credit accumulation.

CURRICULUM STRUCTURE
ENGINEERING PROGRAMME

BMIG

PROGRAM DETAILS

BACHELOR OF MANUFACTURING ENGINEERING WITH HONOURS

The Bachelor of Manufacturing Engineering with Honours is designed to fulfil the government's aspiration to produce multi-skilled graduates in Manufacturing Engineering that would uphold the growth of manufacturing industries in Malaysia.

This programme blends engineering fundamentals with core manufacturing courses including manufacturing process, materials, quality control, automation and control, and manufacturing management. Graduates from this program are expected to have strong engineering background and skills required by the industries to build their career as Process Engineer, Design Engineer, Production Engineer, Project Engineer, Quality Engineer, Manufacturing Engineer, Sales Engineer, and Consultant in diverse industries.

BMIG

Programme Educational Objectives (PEO)

Program Educational Objectives (PEO) are specific goals describing graduates' expected achievements in their career and professional life after graduation. Following are the PEOs for the Bachelor of Manufacturing Engineering programme.

PEO 1	Alumni adapt to transformation of knowledge and are highly competent to solve engineering and manufacturing related problem.
PEO 2	Alumni demonstrate leadership skills with good ethics.
PEO 3	Alumni pursue lifelong learning activities as well as creative and innovative to the needs of the industry and society.

BMIG

Programme Learning Outcomes (PLO)

Programme Learning Outcomes (PLO) 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 program of studies.

PLO1	Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and manufacturing engineering to develop solutions to complex engineering problems.	**Engineering Knowledge**
PLO2	Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development.	**Problem Analysis**
PLO3	Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required.	**Design/ Development of Solutions**
PLO4	Conduct investigation of complex engineering problems using research methods including research-based knowledge, including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.	**Investigation**
PLO5	Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems.	**Tool Usage**
PLO6	Analyze and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving complex engineering problems.	**The Engineer and the World**
PLO7	Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion.	**Ethics**
PLO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face-to-face, remote and distributed settings.	**Individual and Collaborative Teamwork**
PLO9	Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.	**Communication**
PLO10	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects in multidisciplinary environments.	**Project Management and Finance**
PLO11	Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change	**Lifelong Learning**

BMIG

Full / Part Time Programme Implementation

This BMIG program would take four (4) years minimum and consist of at least 135 credit hours. The BMIG Part Time program will take five (5) years and 6 months to complete. The programme will emphasis of Manufacturing Engineering with the composition of the credits are follows:

COMPONENTS		CREDIT HOURS	PERCENTAGE
Compulsory University Course (W)		14	10.37%
Co-Curriculum (W)		2	1.48%
Core Course (P)	Programme	93	68.9%
	Engineering Seminar	1	0.74%
	Industrial Training	5	3.70%
	Final Year Project	6	4.44%
Elective (E)	University	2	1.48%
	Programme	12	8.88%
Total		**135**	**100%**

This programme emphasizes on the theoretical and tutorial, computer-aided learning, and problem base learning (PBL). It also encourages active and cooperative learning activities other than carrying out assignments, job, workshops, industrial training and final year project.

BMIG (FULL TIME)

Curriculum Details & Structure 2026/2027

		YEAR 1		YEAR 2		YEAR 3			YEAR 4		Credits
		Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 3	Sem. 1	Sem. 2	
University Compulsory Courses		BKK* ***1 Co-Curriculum I	BLLW 1142 English For Academic Purposes	BLLW 2152 Academic Writing	BLLW 3162 English For Professional Interaction				BTMW 4012 Technology Entrepreneurship		18
			BLHW 1772 Philosophy and Current Challenges/ *BLHW 1762 Philosophy and Current Issues	BLHW 2722 Malaysian Nation State Aspiration/ *BLHW 2762 Malaysian Citra	**BLHW 2792 Integrity and Anti-Corruption BLHC 4032 Critical and Creative Thinking						
			BKK* ***1 Co-Curriculum 2								
University Elective Courses		BLLW ***2 Language Elective / *BLLW 1282 Malay 2									
Programme Core Course	Math, Statistics & Computing	BMIG 1313 Engineering Mathematics 1	BMIG 1013 Differential Equation	BMIG 2143 Engineering Statistic	BMIG 2443 Engineering Mathematics 2						14
				BMIA 2232 Programming for Engineers							
	Engineering	BELG 1123 Principle of Electric and Electronics	BMIG 1113 Statics	BELG 1233 Principles of Instrumentation & Measurement	BELM 2342 Introduction to Mechatronics Systems	BMII 3122 Project Management	BMIG 3113 Engineering Economy	BMIU 3935 Industrial Training (10weeks)	BMIU 4912 Bachelor Degree Project 1	BMIU 4924 Bachelor Degree Project 2	39
		BMIG 1413 Engineering Graphics and CADD	BMIG 1213 Engineering Materials						BMIU 4223 Integrated Design Project	BMIU 4322 Engineer and Society	
										BMIU 4321 Engineering Seminar	
Course Core		BMIS 1122 Manufacturing Workshop	BMIS 1623 Advanced Manufacturing Process	BMIA 2123 Dynamics	BMIG 2223 Quality Control and Assurance	BMIR 3313 Mechanics of Machine	BMIR 3513 Product Design and Manufacturing		BMIP 4413 Manufacturing Management		52
		BMIS 1613 Manufacturing Process	BMIB 1221 Engineering Lab 1	BMIR 2213 Thermofluids	BMIB 2413 Strength of Materials	BMIB 3323 Material Selection	BMIP 3423 Industrial Engineering				
					BMIP 2122 Manufacturing Sustainability	BMIA 3213 Industrial Automation	BMIR 3223 CAD/CAM/CAE				
					BMIA 2121 Engineering Lab 2	BMIS 3613 CNC Machining	BMIA 3313 Control Systems				
						BMIP 3111 Engineering Lab 3					
Electives Courses									B*** ***3 Elective 1	BMI* 4**3 Elective 3	12
									BMI* 4**3 Elective 2	BMI* 4**3 Elective 4	
Credits		17	18	18	18	15	15	5	16	13	135

** For International Student Only*

*** Referring to Non-Credit Course Exemption (if student attained Credit Transfer for Integrity and Anti- Corruption, then students will be required to replace the credit with Critical and Creative Thinking)*

BMIG (PART TIME)

Curriculum Details & Structure 2026/2027

		YEAR 1			YEAR 2			YEAR 3			Credits
		Sem. 1	Sem. 2	Sem. 3	Sem. 1	Sem. 2	Sem. 3	Sem. 1	Sem. 2	Sem. 3	
University Compulsory Courses		BLHW 1772 Philosophy and Current Challenges/ *BLHW 1762 Philosophy and Current Issues	BKK* ***1 Co-Curriculum I		BLLW 3162 English For Professional Interaction	**BLHW 2792 Integrity and Anti-Corruption	BLLW 2152 Academic Writing	BLHW 2722 Malaysian Nation State Aspiration/ *BLHW 2762 Malaysian Citra	BKK* ***1 Co-Curriculum 2		14
		BLLW 1142 English For Academic Purposes									
University Elective Courses					BLLW ***2 Language Elective / *BLLW 1282 Malay 2						2
Programme Core Course	Math, Statistics & Computing	BMIG 1313 Engineering Mathematics 1	BMIG 2443 Engineering Mathematics 2		BMIG 1013 Differential Equation		BMIA 2232 Programming for Engineers	BERN 2143/ BMIG 2143 Engineering Statistic			14
	Engineering		BMIG 1113 Statics	BMKU1313/ BMIG 1413 Engineering Graphics and CADD	BELG 1123 Principle of Electric and Electronics	BELM 2342 Introduction to Mechatronics Systems					17
			BMIG 1213 Engineering Materials			BELG 1233 Principles of Instrumentation & Measurement					
Course Core		BMIS 1613 Manufacturing Process		BMIS 1122 Manufacturing Workshop	BMIS 1623 Advanced Manufacturing Process	BMIA 2123 Dynamics	BMIA 2121 Engineering Lab 2	BMIB 3323 Material Selection	BMIB 2413 Strength of Materials	BMIR 3223 CAD/CAM/CAE	34
				BMIB 1221 Engineering Lab 1			BMIP 3111 Engineering Lab 3		BMIP 3423 Industrial Engineering	BMIS 3613 CNC Machining	
									BMIP 2122 Manufacturing Sustainability		
Electives Courses											0
Credits		10	10	6	11	10	6	11	9	6	79

** For International Student Only*

*** Referring to Non-Credit Course Exemption (if student attained Credit Transfer for Integrity and Anti- Corruption, then students will be required to replace the credit with Critical and Creative Thinking)*

BMIG (PART TIME)

Curriculum Details & Structure 2026/2027

		YEAR 4			YEAR 5			YEAR 6			Credits
		Sem. 1	Sem. 2	Sem. 3	Sem. 1	Sem. 2	Sem. 3	Sem. 1	Sem. 2	Sem. 3	
University Compulsory Courses			BLLW 3162 English For Professional Interaction		BTMW 4012 Technology Entrepreneurship						4
University Elective Courses											0
Programme Core Course	Math, Statistics & Computing										22
	Engineering		BMIU 3113 Engineering Economy	BMIU 3935 Industrial Training (10weeks)	BMIU 4223 Integrated Design Project	BMIU 4321 Engineering Seminar		BMIU 4322 Engineer and Society			
			BMII 3122 Project Management			BMIU 4912 Bachelor Degree Project 1		BMIU 4924 Bachelor Degree Project 2			
Course Core		BMIA 3213 Industrial Automation	BMIR 3513 Product Design and Manufacturing		BMIA 3313 Control Systems						18
		BMIR 3313 Mechanics of Machine									
		BMIG 2223 Quality Control and Assurance			BMIP 4413 Manufacturing Management						
Electives Courses						B*** ***3 Elective 1	BMI* 4**3 Elective 3				12
						BMI* 4**3 Elective 2	BMI* 4**3 Elective 4				
Credits		9	10	5	11	9	6	6	0	0	56

** For International Student Only*

*** Referring to Non-Credit Course Exemption (if student attained Credit Transfer for Integrity and Anti-Corruption, then students will be required to replace the credit with Critical and Creative Thinking)*

SYLLABUS (BMIG)

University Compulsory Courses

- Co-Curriculum I
- Co-Curriculum II
- English for Academic Purposes
- Academic Writing
- English for Professional
- Interaction
- Integrity and Anti-Corruption
- Technology Entrepreneurship
- Nation State Aspiration/ *Malaysian Citra
- Philosophy and Current Challenges/ *Philosophy and Current Issues

University Elective Courses

- Language Elective

Program Core Courses (Math, Statistics & Computing)

- Engineering Mathematics 1
- Engineering Mathematics 2
- Differential Equation
- Engineering Statistics
- Programming for Engineers

Program Core Courses (Engineering)

- Engineering Graphics and CADD
- Statics
- Engineering Materials
- Principle of Electric & Electronics
- Principles of Instrumentation and Measurement
- Introduction to Mechatronics Systems
- Engineering Economy
- Project Management
- Integrated Design Project
- Industrial Training
- Bachelor Degree Project 1
- Bachelor Degree Project 2
- Engineer and Society
- Engineering Seminar

BMIG-Course Core

- Manufacturing Workshop
- Manufacturing Process
- Advanced Manufacturing Process
- Thermofluids
- Dynamics
- Strength of Materials
- Engineering Laboratory 1
- Engineering Laboratory 2
- Engineering Laboratory 3
- Quality Control and Assurance
- Industrial Automation
- Product Design and Manufacturing
- Mechanics of Machine
- Material Selection
- Control Systems
- Industrial Engineering
- CAD/ CAM/ CAE
- Manufacturing Sustainability
- CNC Machining
- Manufacturing Management

**International Students*

BMIG-Elective Courses

Elective 1 (IR4.0)

- BITI 2513
  Introduction to Data Science
- BITM 2313
  Human Computer Interaction
- BITS 3423
  Information Technology Security
- BMIG 4123
  Cloud Manufacturing
- BMIA 4123
  Intelligent System
- BMIR 4613
  Additive Manufacturing
- BMIA 4413
  Machine Learning
- BMIA 4513
  Object Oriented Programming

Elective 2

- BMIP 4113
  Industrial Ergonomics
- BMIA 4113
  Industrial Robotics
- BMIP 4313
  Modelling and Simulation
- BMIB 4713
  Green Materials and Biomaterials
- BMIS 4513
  Metal Processing Technologies
- BMIB 4113
  Advanced Materials
- BMIG 4443
  Special Topics in Manufacturing Engineering

Elective 3

- BMIA 4323
  Industrial Drives System
- BMIB 4123
  Materials Characterization
- BMIP 4123
  Production Optimization
- BMIR 4223
  Production Tools Design
- BMIS 4123
  Surface Engineering in Manufacturing
- BMIR 4513
  Ergonomics in Design
- BMIS 4723
  Aerospace Manufacturing and Machining

Elective 4

- BMIA 4213
  Mechatronics
- BMIB 4723
  Nanotechnology
- BMIP 4323
  Lean Six Sigma
- BMIR 4423
  Concurrent Engineering
- BMIS 4523
  Advanced CNC Machining
- BMIS 4113
  Non-Metallic Processes
- BMIA 4523
  Applied Mechatronics

Language Electives Courses

- BLLW 1212
  Arabic Language
- BLLW 1222
  Mandarin Language
- BLLW 1232
  Japanese Language
- BLLW 1242
  Korean Language 1
- BLLW 1252
  German 1

Certification

- Lean Six Sigma (Yellow Belt) Professional Certification
- CATIA V5 Part Design Professional Certification
- SolidWorks Associate Certification
- Ergonomics Trained Person (ETP) Certification Preparation
- Non-Destructive Testing (NDT) Professional Certification Preparation

** It is mandatory for all students to sit for the professional certification as part of the graduation requirement.*

BMIF

PROGRAM DETAILS

BACHELOR OF INDUSTRIAL ENGINEERING WITH HONOURS

WHAT IS INDUSTRIAL ENGINEERING?

Industrial Engineering concerns the design, installation, and improvement of integrated systems of people, material, information, equipment, and energy. It draws upon specialized knowledge and skills in the mathematical, physical, and social sciences, together with the principles & methods of engineering analysis and design to specify, predict, & evaluate the results to be obtained from such systems.

CAREER PERSPECTIVE

Industrial engineers (IEs) devise efficient systems that integrate workers, machines, materials, information, and energy to make a product or provide a service. They apply science, mathematics, and engineering methods to complex system integration and operations. Thus, IEs have knowledge and skills in a wide variety of disciplines, the ability to work well with people, and a broad, systems perspective. IEs use their knowledge and skills to improve systematic processes through the use of statistical analysis, interpersonal communication, design, planning, quality control, operations management, computer simulation, and problem solving.

BMIF

Programme Educational Objectives (PEO)

Program Educational Objectives (PEO) is specific goals describing expected achievements of graduates in their career and professional life after graduation. Below are the PEO for the Bachelor of Industrial Engineering programme.

PEO 1	Alumni is competence and highly capable as practitioners in Industrial Engineering field.
PEO 2	Alumni demonstrate leadership skills with high ethical values.
PEO 3	Alumni pursue life-long learning as well as creative and innovative engineers that needed by industry and society.

BMIF

Programme Learning Outcomes (PLO)

Programme Learning Outcomes (PLO) 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 program of studies.

PLO1	Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and industrial engineering to develop solutions to complex engineering problems.	**Engineering Knowledge**
PLO2	Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development.	**Problem Analysis**
PLO3	Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required.	**Design/ Development of Solutions**
PLO4	Conduct investigation of complex engineering problems using research methods including research-based knowledge, including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.	**Investigation**
PLO5	Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems.	**Tool Usage**
PLO6	Analyze and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving complex engineering problems.	**The Engineer and the World**
PLO7	Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion.	**Ethics**
PLO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face-to-face, remote and distributed settings.	**Individual and Collaborative Teamwork**
PLO9	Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.	**Communication**
PLO10	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects in multidisciplinary environments.	**Project Management and Finance**
PLO11	Recognize the need for, and have the preparation and ability for i) independent and life- long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change	**Lifelong Learning**

BMIF

Programme Implementation

This program would take four (4) years minimum and consist of at least 135 credit hours. The programme will emphasis of Industrial Engineering with the composition of the credits are follows:

COMPONENTS		CREDIT HOURS	PERCENTAGE
Compulsory University Course (W)		14	10.37%
Co-Curriculum (W)		2	1.48%
Core Course (P)	Programme	93	68.9%
	Engineering Seminar	1	0.74%
	Industrial Training	5	3.70%
	Final Year Project	6	4.44%
Elective (E)	University	2	1.48%
	Programme	12	8.88%
Total		**135**	**100%**

This programme emphasizes on the theoretical and tutorial, computer-aided learning, and problem base learning (PBL). It also encourages active and cooperative learning activities other than carrying out assignments, job, workshops, industrial training and final year project.

BMIF

Curriculum Details & Structure 2026/2027

		YEAR 1		YEAR 2		YEAR 3			YEAR 4		Credits
		Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 3	Sem. 1	Sem. 2	
University Compulsory Courses		BKK* ***1 Co-Curriculum I	BLLW 1142 English for Academic Purposes	BLLW 2152 Academic Writing	BLLW 3162 English for Professional Interaction	BTMW 4012 Technology Entrepreneurship	**BLHW 2792 Integrity and Anti-Corruption				18
			BKK* ***1 Co-Curriculum 2	BLHW 1772 Philosophy and Current Challenges/ *BLHW 1762 Philosophy and Current Issues	BLHW 2722 Malaysian Nation State Aspiration/ *BLHW 2762 Malaysian Citra						
University Elective Courses		BLLW ***2 Language Elective / *BLLW 1282 Malay 2									
Programme Core Course	Math, Statistics & Computing	BMIG 1013 Differential Equation	BMIG 1313 Engineering Mathematics 1	BMIG 2443 Engineering Mathematics 2	BMIG 2143 Engineering Statistic						14
				BMIA 2232 Programming for Engineers							
	Engineering	BMIG 1413 Engineering Graphics and CADD	BELG 1123 Principle of Electric and Electronics	BMIG 1113 Statics		BMIG 3113 Engineering Economy	BMII 3122 Project Management	BMIU 3935 Industrial Training (10weeks)	BMIU 4912 Bachelor Degree Project 1	BMIU 4924 Bachelor Degree Project 2	34
		BMIG 1213 Engineering Materials							BMIU 4223 Integrated Design Project		
									BMIU 4322 Engineer and Society		
									BMIU 4321 Engineering Seminar		
Course Core		BMII 1112 Introduction Industrial Engineering	BMIS 1613 Manufacturing Process	BMIG 2223 Quality Control and Assurance	BMII 2222 Occupational Safey and Health	BMII 3263 System Modelling: Simulation & Computing	BMII 3123 Operation Research		BMII 4122 Supply Chain Management	BMIP 4323 Lean Six Sigma	57
		BMII 1313 Introduction Data Science	BMIS 1122 Manufacturing Workshop	BMII 2112 Work Systems Design	BMII 2223 Human Factors Engineering	BMII 3153 Production Planning and Inventory Control	BMIA 3213 Industrial Automation				
			BMIR 2213 Thermofluids		BMIA 2123 Dynamics	BMIA 3313 Control Systems	BMII 3323 Facility Planning and Design				
			BMIB 1221 Engineering Lab 1		BMIA 2121 Engineering Lab 2	BMIG 4123 Cloud Manufacturing	BMIR 3513 Product Design and Manufacturing				
Electives Courses									B*** ***3 Elective 1	BMI* 4**3 Elective 3	12
									BMI* 4**3 Elective 2	BMI* 4**3 Elective 4	
Credits		17	18	17	16	17	16	5	16	13	135

** For International Student Only*

*** Referring to Non-Credit Course Exemption (if student attained Credit Transfer for Integrity and Anti-Corruption, then students will be required to replace the credit with Critical and Creative Thinking)*

SYLLABUS (BMIF)

Compulsory University Courses

- Co-Curriculum I
- Co-Curriculum II
- English for Academic Purposes
- Academic Writing
- English for Professional Interaction
- Integrity and Anti-Corruption
- Technology Entrepreneurship
- Nation State Aspiration/ *Malaysian Citra
- Philosophy and Current Challenges/ *Philosophy and Current Issues

University Elective Courses

- Language Elective

Program Core Courses (Math, Statistics & Computing)

- Engineering Mathematics 1
- Engineering Mathematics 2
- Differential Equation
- Engineering Statistics
- Programming for Engineers

Program Core Courses (Engineering)

- Engineering Graphics and CADD
- Statics
- Engineering Materials
- Principle of Electrical & Electronics
- Engineering Economy
- Project Management
- Integrated Design Project
- Industrial Training
- Bachelor Degree Project 1
- Bachelor Degree Project 2
- Engineer and Society
- Engineering Seminar

BMIF-Course Core

- Introduction to Industrial Engineering
- Introduction to Data Science
- Manufacturing Workshop
- Manufacturing Process
- Engineering Laboratory 1
- Engineering Laboratory 2
- Thermofluids
- Dynamics
- Quality Control and Assurance
- Industrial Automation
- Product Design & Manufacturing
- Control Systems
- Work Systems Design
- Facilities Planning & Design
- Lean Six Sigma
- System Modelling: Simulation & Computing
- Operation Research
- Human Factors Engineering
- Production Planning & Inventory Control
- Supply Chain Management
- Cloud Manufacturing
- Occupational Safety and Health

**International Students*

BMIF Elective Courses

Elective 1

- BMII 4513
  Industrial Accounting and Finance
- BMII 4523
  Industrial Marketing
- BMII 4123
  Economics for Decision Making
- BMII 4223
  Emerging Positive Organizational Behaviour

Elective 2

- BITS 3423
  Information Technology Security
- BITM 2313
  Human Computer Interaction
- BMIA 4123
  Intelligent System

Elective 3

- BMII 4533
  Global Operation Strategy
- BMII 4543
  Optimization Models for Decision Making
- BTMP 2243
  Strategic Innovation Management
- BMII 4443
  Special Topics in Industrial Engineering

Elective 4

- BMIR 4223
  Production Tool Design
- BMIS 4513
  Metal Processing Technologies
- BMIA 4113
  Industrial Robotics
- BMIR 4613
  Additive Manufacturing

Language Electives Courses

- BLLW 1212
  Arabic Language
- BLLW 1222
  Mandarin Language
- BLLW 1232
  Japanese Language
- BLLW 1242
  Korean Language 1
- BLLW 1252
  German 1

Certification

- Lean Six Sigma (Yellow Belt) Professional Certification
- CATIA V5 Part Design Professional Certification
- SolidWorks Associate Certification
- Ergonomics Trained Person (ETP) Certification Preparation
- Non-Destructive Testing (NDT) Professional Certification Preparation

** It is mandatory for all students to sit for the professional certification as part of the graduation requirement.*

PROGRAM CORE COURSES (MATH, STATISTICS & COMPUTING)

ENGINEERING MATHEMATICS 1 (BMIG 1313)

Course Learning Outcome

① Describe the fundamental concepts of matrices, eigenvalues and eigen vector, complex numbers, interpolation, differentiation, integration and vector- valued functions

② Solve the mathematical problems that involve matrices, eigenvalues and eigenvector, complex numbers, interpolation, differentiation, integration and vector- valued functions by using an appropriate technique.

③ Apply the knowledge of engineering mathematics to deal with the engineering problems.

Synopsis

This course is a blend of analytical and numerical approaches that mainly focus on the matrices, nonlinear equations, eigenvalues and eigen vectors, complex numbers, interpolation, differentiation, integration and vector valued functions.

References

- James, G., Modern Engineering Mathematics, 5th edition, Pearson, 2015.
- Khoo, C.F., Sharifah Sakinah, S. A., Zuraini, O. and Lok, Y.Y., Numerical Methods, 3rd edition, Pearson Prentice Hall, 2009.
- Muzalna M.J, Irma Wani J., Rahifa R. and Norazlina A.R., Engineering Mathematics, 2nd edition, Prentice Hall, 2009.

PROGRAMMING FOR ENGINEERS (BMIA 2232)

Course Learning Outcome

① Identify the fundamental principles of problem solving, programming techniques and structures in program development.

② Explain the principles of problem solving and programming techniques to solve given problems.

③ Construct computer program codes by applying suitable programming structures and techniques.

Synopsis

This course covers introductory topics in programming using C++ language. It includes the introduction to computers and programming, the fundamentals of programming, problem solving and software development. Data types and operators, selection, repetition, function, array, file, structured data and pointer are among the topics covered in the course.

References

- Gaddis, T., 2021, Starting Out with C++ Brief Version: From Control Structures Through Objects 10th Edition", Pearson Education.
- Abdullah, N. et. al, 2018, Lab Module Computer Programming, FTMK, UTeM.
- Friedman, K., 2011, Problem Solving, Abstraction and Design using C++, 6th Edition, Pearson Education.
- Etter, D.M., Ingber, J.A., (2012), "Engineering Problem Solving with C++", 3rd Edition, Pearson Education.
- Hanly, J.R, (2002), "Essential C++ for Engineers and Scientists", 2nd Addison Wesley.

DIFFERENTIAL EQUATION (BMIG 1013)

Course Learning Outcome

① Describe the basic concept and solution of second order differential equations, Laplace transform and Fourier series.
② Select an appropriate technique to solve problems involving differential equations.
③ Apply the concept of differential equations in solving engineering problems.

Synopsis

This course is intended to introduce the concept and theories of differential equations. Second order linear differential equations with constant coefficients will be solved by using the methods of undetermined coefficient, variation of parameters and Laplace transform. Fourier series in relation to periodic functions will be discussed. An introduction to the solution and application of partial differential equations with boundary value problems using the method of separation of variables and Fourier series will also be discussed.

References

- Muzalna M. J., Irmawani J., Rahifa R., Nurilyana A. A., 2010, Module 2: Differential Equations, Penerbit UTeM.
- Cengel Y. A. & Palm W. J., 2013, Differential Equations for Engineers and Scientists, 1st Ed. McGraw-Hill., U.S.A.
- Nagle R. K., Saff E. B. & Snider A. D., 2011, Fundamentals of Differential Equations and Boundary Value Problems, 6th Ed. Pearson Education Inc., U.S.A.

ENGINEERING STATISTICS (BMIG 2143)

Course Learning Outcome

① Apply the concepts of data description and probability, normal and sampling distributions, estimation and hypothesis testing, ANOVA, regression and nonparametric tests to solve mathematical problems.
② Analyze engineering data using descriptive statistics.
③ Deduce statistical inference for engineering problems by using the techniques of estimation, hypothesis testing and regression.

Synopsis

This subject comprises of several topics such as data description and probability, normal and sampling distributions, estimation and hypothesis testing for one and two populations, ANOVA, simple linear regression, multiple linear regression, polynomial regression, non-parametric statistics and statistical software application.

References

- Prem S. M., 2016, Introductory Statistics Using Technology, 9th Edition, John Wiley.
- Douglas C. M., George C. R., 2013, Applied Statistics and Probability for Engineers, 6th Edition, John Wiley.
- Richard J., John F., Irwin M., 2017, Probability and Statistics for Engineers, 9th Edition, Pearson – Prentice Hall.

ENGINEERING MATHEMATICS 2 (BMIG 2443)

Course Learning Outcome
① Describe the fundamental concepts of multivariable functions, multiple integrals and vector calculus
② Solve the mathematical problems that involve function of several variables, multiple integrals and vector calculus.
③ Apply the knowledge of advanced engineering mathematics to deal with engineering problems.

Synopsis
This subject consists of three chapters: function of several variables: functions of two or more variables, limit and continuity, partial derivatives, total differential, chain rule, implicit differentiation and local extrema. Multiple integrals: double integral, double integral over nonrectangular regions, double integral in polar coordinates, triple integral, triple integral in cylindrical and spherical coordinates. Vector calculus: vector fields, line integral, green's theorem, curl and divergence, parametric surfaces and their areas, surface integrals, stoke's theorem and divergence theorem.

References

- Ranom, R., Jamaludin, I. W., Razak, N. A., & Apandi, N. I. A. 2021. Engineering Mathematics. Utem Press
- Raji, A. W. M., Kamis, I., Mohamad, M. N., & Tiong, O. C. 2021. Advanced Calculus For Science And Engineering Students. Utm Press.
- Bird, J. 2021. Engineering Mathematics (9th Ed.). Routledge
- Stewart, J., Clegg, D. K., & Watson, S. 2020. Multivariable Calculus (9th Ed.). Boston, Ma: Cengage Learning
- Briggs, W. L., Cochran, L., Gillett, B., & Schulz, E. 2020. Calculus: Early Transcendentals (3rd Ed.). Pearson
- Fehribach, J. D. 2024. Multivariable And Vector Calculus (2nd Ed.). De Gruyter.

PROGRAM CORE COURSES (ENGINEERING) BMIG and BMIF

ENGINEERING GRAPHICS AND CADD (BMIG 1413)

Course Learning Outcome

① Explain the engineering graphics fundamentals.
② Construct technical drawing using manual sketching and computer aided design.
③ Communicate by using engineering drawings.

Synopsis

The purpose of this course is to provide students with an understanding of the importance of engineering graphic communication to the design process and interpreting the engineering drawings. Students will gain hands-on experience creating freehand technical sketches and CAD technical drawings using orthographic projections, section auxiliary views and isometric drawings. Emphasis is placed on creating drawings that are neat, correctly dimensioned using industry standards. Students will use freehand sketches methods and CAD software to develop visualization skills and create the engineering drawings.

References

- Giesecke, Mitchell, Spencer, Hill, Dygdon, Novak and Lockhart, Technical drawing with Engineering Graphics, Pearson, 2010.
- Dix Riley, Discovering AutoCAD 2009, Pentice Hall, 2009.
- Zolkarnain Marjom, Hassan Attan, Engineering Graphics & CADD, for Engineering Students, 2008.

STATICS (BMIG 1113)

Course Learning Outcome

① Describe and apply the fundamental principles of engineering mechanics to model and interpret static systems.
② Analyze and solve equilibrium problems of particles, rigid bodies, and structures using mathematical and graphical methods.
③ Demonstrate the ability to evaluate, justify, and communicate statics solutions for engineering design problems through appropriate methods, diagrams, and tools.

Synopsis

This course introduces students to the fundamental principles of engineering mechanics in static conditions. Students will develop the ability to construct free-body diagrams, apply equilibrium equations, and analyze engineering systems such as beams, trusses, and frames. It focuses on the study of forces, moments, a nd their effects on particles, rigid bodies, and simple structures. The course also covers centroids a nd friction, providing the analytical foundation required for subsequent engineering courses.

References

- Hibbeler R.C., 2022, Engineering Mechanics – Statics, 15th Ed., Prentice Hall.
- Beer F.P and Johnston. E.R. 2011, Statics and Mechanics of Materials, McGraw-Hill.
- Morrow H.W., 2011, Statics and Strength of Materials, Prentice Hall.
- Mott R. L., 2010, Statics And Strength Of Materials, Prentice Hall.

ENGINEERING MATERIALS (BMIG 1213)

Course Learning Outcome

① Explain the basic concepts of engineering materials in terms of interatomic arrangement.
② Determine the properties of engineering materials based on its structure.
③ Analyze the properties of engineering materials for selection of processing methods.

Synopsis

This course introduces basic concepts of engineering materials that covers introduction to engineering materials, interatomic bonding, crystalline structure, as well as imperfections and diffusion in solid. Introduction to the binary phase diagrams are also provided. Explanation on different types of engineering materials (i.e. Metals, ceramics, polymers, composites, and functional), its mechanical properties, basic processing, and applications are also included.

References

- Callister, W.D. Jr., 2018, Materials Science and Engineering - An Introduction, 10h Edition. John Wiley & Sons Inc.
- Askeland, D.R., Fulay, P.P. and Wright, W.J., (2015), The Science and Engineering of Materials, 7th edition. Thomson.
- Smith, W.F. (2010) Principle of Materials Science & Engineering, 5th edition, Mc. Graw Hill.
- Shackelford, J.F. (2022) Introduction to Materials Science for Engineering, 9th Edition, Pearson Education Limited.

PRINCIPLE OF ELECTRIC & ELECTRONICS (BELG 1123)

Course Learning Outcome

① Explain the basic principles of electrical and electronics components, terminologies, configurations, laws, and rules.
② Apply appropriate circuit analysis methods to solve DC (resistive) circuits problems.
③ Analyse circuits containing semiconductor devices.

Synopsis

This course will discuss about the basic principles of electrical and electronics; Introduction to electric element, symbol and components. KCL, KVL, Node and Mesh in solving DC series and parallel circuit. Introduction in magnetism, electromagnetism and AC characteristic. Introduction to semiconductors, atomic structures, energy band, P-type and N-type. Study on structure, principle and application of diode, BJT and Op-Amp circuits.

References

- Thomas L. F., 2010, Principles of Electric Circuits, Pearson, 9th Ed.
- Thomas L. F. and David M. B., 2010, Electric Circuits Fundamentals, Pearson, 8th Ed.).
- Boylestad, R.L.; Nasheslsky, L, 2010, Electronic Devices and Circuit Theory, Pearson Prentice Hall.

ENGINEERING ECONOMY (BMIU 3113)

Course Learning Outcome

① Explain the principles and terminology of engineering economy, concepts of time value of money, and risk planning.
② Apply the concepts, principles and techniques in engineering economy.
③ Analyze complex problems and scenario using engineering economy factors (F/P, P/F, P/A, A/P, F/A, A/F, P/G, A/G factors).
④ Evaluate and select between alternatives using suitable methods such as Present Worth, Future Worth, Annual Worth Analysis; Breakeven & Payback Analysis.

Synopsis

The course covers engineering economy. Engineering economy discusses about the time value of money and interest relationship; engineering economy factors; nominal and effective interest rates; worth analysis; breakeven and payback analysis; 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.

References

- Blank, L and Tarquin, A., 2024, Engineering Economy, 9th Edition, McGraw Hill.
- Whitman D. and Terry R., 2012, Fundamentals of Engineering Economics and Decision Analysis, Morgan& Claypool Publishers.
- Sullivan, W.G., Wicks, E.M., and Koelling, C.P., 2019, Engineering Economy, 17th Edition, Prentice Hall.
- Park C.S., 2022, Contemporary Engineering Economics, 7th Edition, Pearson.

PROJECT MANAGEMENT (BMII 3122)

Course Learning Outcome

① Apply the concepts, principle and techniques in Project Management.
② Develop Project Network using Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT).
③ Evaluate the project risk management in engineering project.
④ Demonstrate student competency in using software of Project Management.

Synopsis

Project Management is essential for most engineers in delivering projects with meet predetermined objectives. This course consists of; organizational strategy & projects, organizational structure and culture, project definition, estimating project times & costs, developing project plan, risk management, scheduling resources, project time compression, the role of leadership, managing project teams, and project monitoring. During the tutorial session, the student will learn to use Microsoft office project software for the following application: (i) creating work breakdown structure (WBS) and project schedule, (ii) assign resources to specific tasks, (iii) assessing resource over allocation, (iv) calculate total cost of a project by task and by resource, and
(v) examining schedule variance in real time
.

Reference

- Blank,L and Tarquin, A., 2021, Basic af Engineering Economy
- Blank, L. Tarquin, A., 2012, Engineering Economy, 7thedition, Mcgraw Hill
- Clifford F. Gray and Erik W. Larson, Project Management: The Managerial Process, 8th Edition, Mc Graw Hill, 2021.
- Jeffrey K. Pinto., Project Management: Achieving Competitive Advantage, 5th Edition, Pearson, 2019.
- Wysocki Robert K., Effective Project Management: Traditional, Agile, Extreme, Hybrid, Eighth Edition, Wiley, 2019.

INTEGRATED DESIGN PROJECT (BMIU 4223)

Course Learning Outcome

① Design solution by synthesizing manufacturing engineering knowledge that will solve complex manufacturing engineering problem in accordance with relevant standards.
② Utilize modern engineering and IT tools in facilitating solutions to complex manufacturing engineering 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.
④ Demonstrate effectively teamwork skill in completing the IDP.
⑤ Apply project management and financial knowledge effectively in completing the IDP.

Synopsis

Integrated design project (IDP) requires the students to use the fundamental of engineering knowledge to solve engineering problems or develop a practical product with consideration of safety, environment, and sustainability factors. The product development process includes integration of market study, conceptual design, material selection, process selection engineering analysis and product fabrication while incorporating project management components and economic feasibility study. The IDP projects will be executed with a team-based approach with supervision by academic lecturers to enhance the teamwork, communication, and problem-solving skill in accordance with industrial practise.

References

- Integrated Design Project Guidebook 2023
- Ulrich, K. T. and Eppinger, Steven D., 2019, Product Design and Development, 7th edition, Mc Graw Hill.
- Chitale, A. K. and Gupta, R. C., 2015. Product Design and Manufacture, 6th edition, Prentice Hall, New Delhi, India.
- Kalpakjian, S. and Schmid, S. R., 2014, Manufacturing Engineering & Technology, 7th edition, Prentice Hall.
- W. Bolton, Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering, 4th Edition, Prentice Hall, 2008.
- Cross, Nigel, Engineering Design Methods, Wiley 2010
- Kutz, Myer, Mechanical Engineers Handbook-Manufacturing and Management, 4th Edition, John and Wiley, 2015

PRE-REQUISITE
BMIR 3513 PRODUCT DEISGN AND MANUFACTURING

INDUSTRIAL TRAINING (BMIU 3935)

Course Learning Outcome

① Apply skills and knowledge on engineering fundamentals.
② Analyze and/or solve engineering related problems in industry using methods, tools and techniques learnt at the university
③ Demonstrate ethics and professionalism in engineering practice.
④ Able to communicate effectively with the technical community and produce effective reports and presentations.

Synopsis

Industrial training is a compulsory component for degree program students at Universiti Teknikal Malaysia Melaka (UTeM). The experiences and skills acquired from a period of placement can be invaluable and provide the advantage to the students when applying for employment after graduation. During the training period with the relevant industry, students are expected to involve in the following areas of training in order to achieve the underlying objectives, such as; Manufacturing / production process and / or its optimization process, Mechanical design and product / system development, Maintenance and repair of machineries or equipment, and Product testing & quality control. After completing those training, the students are expected to possess a certain level of “hands – on practical experience” related to their own field of studies particularly.

References

- Portal Universiti Teknikal Malaysia Melaka, https://portal.utem.edu.my/iclm/, portal UTeM Industrial Training System.

BACHELOR DEGREE PROJECT 1 (BMIU 4912)

Course Learning Outcome

① Identify the problem statement, objectives and scope of project.
② Choose appropriate methodology to solve complex engineering problem based on relevant literature review.
③ Demonstrate ethical principles, responsibilities and norms of engineering practice.
④ Demonstrate knowledge and principles of project management.
⑤ Communicate effectively on complex engineering activities and write effective reports.

Synopsis

This course, refers to the final year project of the students under the guidance of a supervisor, the work includes designing, evaluating and analyzing components or systems related to the scope of a project. A written proposal, progress reports, and final written report are required. An oral presentation is required upon completion of the course.

References

- Student Guidelines for Final Year Project, Fakulti Teknologi & Kejuruteraan Industri & Pembuatan, Universiti Teknikal Malaysia Melaka. https://ftkip.utem.edu.my/

BACHELOR DEGREE PROJECT 2 (BMIU 4924)

Course Learning Outcome

① Design solutions, systems, components or processes for complex engineering problems that are sustainable and meet specified requirements.
② Investigation complex problems using research-based knowledge, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
③ Demonstrate ethical principles, responsibilities and norms of engineering practice.
④ Engage in life-long learning activities and adapt to new and emerging technology.
⑤ Communicate effectively on complex engineering activities and write effective reports.

Synopsis

This course, refers to the final year project of the students under the guidance of a supervisor, the work includes designing, evaluating and analyzing components or systems related to the scope of a project. A written proposal, progress reports, and final written report are required. An oral presentation is required upon completion of the course.

Pre-Requisite

BMIU 4912

References

- Student Guidelines for Final Year Project, Fakulti Teknologi & Kejuruteraan Industri & Pembuatan, Universiti Teknikal Malaysia Melaka. https://ftkip.utem.edu.my/

ENGINEER AND SOCIETY (BMIU 4322)

Course Learning Outcome

① Apply ethical principles and commitment to professional ethics, responsibilities, and norms of engineering practice.
② Apply reasoning informed by contextual knowledge to assess health, safety, and legal issues and its subsequent responsibilities, relevant to professional practice.
③ Understand the needs for sustainable development and the impact of engineering solutions on society and the environment.

Synopsis

This course will discuss issues that are related to the engineering profession. It will cover topics such as personal ethics, professional ethics, code of ethics, ethics dealing with human relations, professionalism, BEM, IEM, regulations on professional conduct, route to professional status, engineers as an employee or employer, decision making, ethical considerations, competence of practicing engineering, safety issues, and related laws, health issues in the profession, safety and health management systems, accountability, general liability, engineer's legal liability specified in contract law, the environment, sustainability, etc. These issues will be examined and applied on daily contextual situations based on the existing laws, manuals, guidelines and case studies.

References

- Charles B Fleddermann, "Engineering Ethics" 3rd Ed, Prentice Hall, 2008.
- Mike W Martin, Roland Schinzinger, "Ethics in Engineering" 4Th Ed, MCGRAW-HILL, 2005.
- Charles E Harris Jr, Michael S Pritchard, Michael J Rabin, "Engineering Ethics" 2nd Ed, Thomson and Wadsworth, 2003.
- Jose A. Cruz-Cruz And William Frey, "Engineering Ethics Modules For Ethics Across The Curriculum" OPENSTAX-CNX, 2014.

ENGINEERING SEMINAR (BMIU 4321)

Course Learning Outcome

① Recognize the need for life-long learning in the careers of professionals in the field of manufacturing engineering.
② Recognize the range of career options available.
③ Demonstrate the ability to discuss range of contemporary issues impacting engineering professionals.
④ Discuss the role of professional societies in the careers of professionals in the field of manufacturing engineering.

Synopsis

The main purpose of this course is to instill the recognition of the need for and the ability to engage in life-long learning among students. Through presentation by invited speakers from the industry and academia, students will be exposed to topics such as professional engineering bodies and knowledge of in contemporary issues in related engineering fields. Presentation by successful alumni describing how their careers developed after obtaining their undergraduate degrees will also be included.

PRINCIPLES OF INSTRUMENTATION & MEASUREMENT (BELG 1233)

Course Learning Outcome

① Describe the principle, various terms and standards in measurement.
② Explain the principle of measurement devices.
③ Apply the suitable bridge techniques to measure component values such as resistance, inductance and capacitance.
④ Explain the operation, function and applications of transducers/sensors.

Synopsis

This subject discusses about units and dimensions, standards, errors, static characteristic, noise and calibration in measurement. It covers most on the measurement devices such as galvanometers, ammeters, voltmeters, wattmeter, temperature, force and torque and pressure measurement as well as accelerator meter. It also introduces oscilloscope and sensors for instrumentation application.

References

- Kalsi, H.S., 2010, Electronic Instrumentation, 3rd Ed., Tata McGraw Hill.
- Bakshi, U.A, Bakshi, A.V. and Bakshi, K.A., 2009, Electronic Measurements and Instrumentation, Technical Publications Pune.
- § Wolf, S., Richard, F.M., 2004, Reference Manual for Electronic Instrumentation Laboratories 2nd Ed., Prentice-Hall.

INTRODUCTION TO MECHATRONICS SYSTEMS (BELM 2342)

Course Learning Outcome

① Explain basic concept of mechatronic systems.
② Explain the working principles of mechatronic systems.
③ Analyze selection and integration of mechatronics components.
④ Identify and analyze problems in basic mechatronics system.

Synopsis

This subject introduces the concept of mechatronic system and its element and integration. Topics that are covered include the following: Introduction to sensors and transducers, performance terminology, static and dynamic characteristics. Example of relevant sensors, selection of sensors. Inputting data by switches. Introduction to signal conditioning, operational amplifier, protection, filtering, Wheatstone bridge, digital signal, multiplexers, data acquisition, digital signal processing, pulse modulation displays, data presentation elements, magnetic recording, displays, data acquisition systems, testing and calibration. Introduction to actuation systems, introduction to pneumatic and hydraulic systems, directional control valves, pressure control valves, cylinders, process control valves, rotary actuators. Introduction to mechanical systems, types of motion, kinematic chain, cams, gear trains, ratchet and pawl, belt and chain drives, bearings, mechanical aspects of motor selection. Introduction to electrical systems, mechanical switches, solid-state switches, solenoids, DC motors, AC. motors, stepper motors. Mathematical models, mechanical system building blocks, electrical system building blocks, fluid system building blocks, thermal system building blocks. System model of engineering systems, rotational- translational systems, electromechanical systems and hydraulic-mechanical systems. Brief description of mechatronics system related topics: system transfer function, frequency response, closed loop controller, digital logic, microprocessor, assembly language, c language, input/output systems or interfacing, programmable logic controllers, communication systems, fault finding.

References

- Bolton, W., Mechatronics: Electronic Control Systems In Mechanical and Electrical Engineering, 7th Ed., Prentice-Hall, 2018.
- Dieter, G.E. & Schmidt, L.C.(2013). Engineering Design, 5th Edition, Mcgraw Hill.
- Medriam, J.L., Engineering Mechanics: Static, 5th Edition, John Wiley & Sons, 2003.
- Saeed B. Niku, Introduction To Robotics, Prentice-Hall, 2001.
- Katsuhiko Ogata Modern, Control Engineering, Prentice-Hall, 1996.
- Devdas, S., Richard, A.K., Mechatronics System Designs, Pws, 1997.
- Robert L. Norton, Machine Design An Integrated Approach 3rd Edition, Pearson Prentice Hall 2006.
- Auslander, D.M., Mechatronics: Mechanical System Interfacing, 1996.

COURSE CORE BMIG & BMIF

MANUFACTURING WORKSHOP (BMIS 1122)

Course Learning Outcome

① Describe and demonstrate proper use of basic engineering equipment and requirement.
② Produce product based on technical drawing.
③ Fabricate products that meet specific tolerance.

Synopsis

The practice consists of introduction to basic knowledge of using manual hand tools, cutting tools, machine tools, welding, fabrication, fitting, casting and milling. This course introduces common equipment for performing manufacturing works such as: Lathe and milling machine, arc welding, sheet metal forming, basic foundry, etc.

References

- Kalpakjian, S and Schmid, R., 2025, Manufacturing Engineering and Technology, 9th Edition, Pearson.
- Mikell P. G. (2022) Fundamental of Modern Manufacturing, 7th Edition, Wiley.
- Kibbe, R., Meyer, R.O., Sternerson, J. and Curran K. (2021) Machine Tool Practices. 11th Edition, Pearson.

STRENGTH OF MATERIALS (BMIB 2413)

Course Learning Outcome

① Apply basic concepts and fundamental principles of strength of materials.
② Solve for stress, strain and deformation associated with axial loading, torsional loading and combined stresses, based on statically determinate and indeterminate structures.
③ Analyze stress, strain and deformation of structural members subjected to bending.

Synopsis

This course covers introduction to the concept of stress, strain and deformation of various structural members subjected to tension, compression, torsion, and bending to solve problems related to isotropic elasticity. Free body diagram (FBD) for rigid bodies, 2-D and 3-D structures, frames and machines are important to set up equilibrium equations (i.e. Forces and moments) in order to identify stress or strain at a point in solving problems related to engineering structures. Determination of principal stresses and angles, maximum shearing stresses and angles and the stresses acting on any arbitrary plane within a structural element using Mohr's Circle is also included in this course.

References

- Russell C. Hibbeler, 2017, Mechanics of Materials in SI units 10th edition, Pearson.
- Ferdinand P. Beer, E. Russel Johnston Jr, John T. Dewolf, David F. Kazurek, 2014, Mechanics of Materials 7th edition, Mc Graw Hill.
- William F. Riley, Leroy D. Sturges, Don H. Morris, 2007, Mechanics of Materials, 6th edition, Wiley.

ENGINEERING LABORATORY 1 (BMIB 1221)

Course Learning Outcome
① Apply knowledge on engineering materials and statics principles.
② Write sufficient technical reports on engineering materials and statics experiments.

Synopsis
Engineering Laboratory 1 consists of laboratory works combining the engineering materials and statics fundamentals. In the engineering materials session, clear understanding of welding metallurgy related to robot welding process and engineering materials properties characterization (standard engineering materials laboratory testing) will be provided. In addition, students will also be exposed to the fundamental relationship between robot welding process parameters (current, voltage, speed) structure and properties of the materials focusing on welding metallurgy. Through the engineering statics laboratory, the students will be conducting three experiments related to the topics what they have learned in the lectures. Examples of experiments include equilibrium of a particle, force system resultants (moment), and dry friction. In overall, emphasis will be placed on safe laboratory practices, proper methodology of data recording and skillful technical writing of reports.

References

- Callister Jr, W. D., & Rethwisch, D. G. (2020). Materials science and engineering: an introduction. John wiley & sons.
- Kalpakjian, S. and Schimd, R. (2025) Manufacturing Engineering and Technology, 9th Edition, Pearson.
- Hibbeler R.C., (2016) Engineering Mechanics – Statics, SI Edition, Pearson.
- Beer F.P and Johnston E.R., Dewolf J. T., Mazurrek D. F. (2020) Statics and Mechanics of Materials, McGraw-Hill.

MANUFACTURING PROCESS (BMIS 1613)

Course Learning Outcome
① Describe characteristics of manufacturing processes applied in the industry.
② Analyze the capability of various manufacturing processes in products development.
③ Develop various skills and techniques in manufacturing process as an individual or in a group.

Synopsis
This course introduces students to manufacturing activities that mainly focus on metal removal, metal forming, shaping processes and joining process. For metal removal processes, students will be taught the fundamental concept of cutting, cutting tool materials and cutting fluids. It also includes the machining processes used to produce round shapes such as lathe operation, boring, drilling, reaming and tapping. For producing other shapes using milling, shaping, broaching and sawing processes, filling operation will be required. Besides, the students will be provided with a clear understanding of metal forming and metal shaping processes such as rolling, forging, extrusion, drawing of metals and sheet metal forming. Student will also be exposed to various welding processes.

References

- Kalpakjian, S and Schmid, R., 2025, Manufacturing Engineering and Technology, 9th Edition, Pearson.
- Mikell P. Groover, Introduction to Manufacturing Processes, 3rd Edition, Mc Graw-Hill International Editions, 2011.
- Rao, P.N., 2013, Manufacturing Technology – Metal Cutting and Machine Tool, 3rd Edition, Mc Graw Hill.
- Timing, R. (2004), Basic manufacturing, 3rd Edition, Newnes.

THERMOFLUIDS (BMIR 2213)

Course Learning Outcome

① Identify the thermodynamic properties of pure substances using tables of property data.
② Apply the thermodynamic First Law and Second Law and heat transfer mechanisms to determine the performance of thermal systems.
③ Apply the basic concepts of fluid mechanics to solve engineering problems.

Synopsis

The course is given to introduce the student to the basic engineering of thermodynamics that involved study on the energy transformation, working fluids, theory and application of first and second laws of thermodynamics. The course also covers explanations on the steam and gas power plant as a direct application of the thermodynamic theory. Fundamental of heat transfer is also given to expose student to the many practice examples of the thermodynamics principles. The other phase of this course is to introduce the students to the basics of fluid mechanics. The course covers the study of the fluid static and dynamic analysis, buoyancy and stability, Bernoulli equation, momentum principle and flow behavior.

References

- Cengel, Y.A., Turner, R.H., Cimbala, J.M., 2019, 5th Edition in SI Units, “Fundamentals of Thermal-Fluid Sciences”, McGraw Hill, New York.
- Kaminski, D. A. and Jensen, M. K., 2005, Introduction to Thermal and Fluid Engineering, John Wiley & Sons,Inc.
- Cengel, Y.A., Michael, A.B., (2018), 9th edition, Thermodynamics, an Engineering Approach, Mc Graw Hill, New York.

DYNAMICS (BMIA 2123)

Course Learning Outcome

① Solve engineering dynamics problems using kinematic and kinetic equations of motion.
② Apply the principles of work and energy, as well as impulse and momentum, to analyse engineering dynamics problems.
③ Analyse the dynamics of particles and rigid bodies using the principles of force and acceleration, work and energy, and impulse and momentum.

Synopsis

The course develops student’s ability to solve a range of problems in engineering dynamics. Dynamics involves the action of forces on a system in motion. Topics covered include kinematics, force and acceleration, work and energy, and impulse and momentum formulations for particle and rigid body. Students are expected to have fundamentals in engineering statics, algebra, trigonometry, and calculus.

References

- Russell C. Hibbeler, 2021, Engineering Mechanics: Dynamics, 15th Edition, Pearson.
- Ferdinand P. Beer, E. Russell Johnston Jr., Phillip J.Cornwell, 2015, Vector Mechanics for Engineers: Dynamics, 11th Edition, New York, NY: McGraw-Hill.
- Meriam, J.L., Kraige, L.G. 2015, Engineering Mechanics: Dynamics, 7th Edition, New York, NJ: John Wiley & Sons.

ADVANCED MANUFACTURING PROCESS (BMIS 1623)

Course Learning Outcome

① Describe the operating principles of manufacturing processes.
② Select appropriate manufacturing processes for a given product design based on functional requirements and cost considerations, and identify the principles of non-traditional manufacturing systems.
③ Work effectively in teams to complete assigned manufacturing-related projects.

Synopsis

Advanced manufacturing processes are often use to machine or finish products that are made of hard materials, tough super alloys, ceramics, and composites. Another reason for choosing advanced manufacturing process is that the features to be machined are often difficult or impossible to do with traditional methods. Advanced manufacturing processes utilize electrical, chemical, and optimal sources of energy to form and cut materials through subtractive, additive, continuous or net shape mechanism. This course will provide students with the fundamentals and understanding of the advanced manufacturing processes principle utilized in industries.

References

- Mikell, P.G., 2016, Fundamental of Modern Manufacturing Process, 6th Edition, Prentice Hall.
- Gregg, R., 2004, Modern Materials and Manufacturing Processes, Prentice Hall.
- Degarmo, B.K., 2003, Materials and Processes in Manufacturing, 9th Edition, Prentice Hall.

QUALITY CONTROLAND ASSURANCE (BMIG 2223)

Course Learning Outcome

① Explain the basic quality principles, tools and techniques related to manufacturing industries.
② Apply the quality tools and/or techniques such as Statistical Process Control, control charts, Taguchi methods, Quality Functional Deployment, and Failure Mode and Effect Analysis.
③ Analyze manufacturing process and its issues using quality tools and/or techniques.

Synopsis

This course provides a sound understanding of the basic principles of quality control and the applications of quality improvement tools. Students will be first introduced to the evolution and fundamentals of quality followed by the fundamental differences between quality control and quality assurance. Apart from providing sufficient theory to ensure a strong understanding of basic quality principles, the course also stressed a practical approach with focus on the quantitative aspects of statistical process control. This will include sections on the use of pareto charts, cause and effect diagrams, process flow and scatter diagrams. Specific focus will be on the use of control charts for variables and attributes. The end of the course will expand the scope of quality to the importance of acceptance sampling and systems' reliability.

References

- Besterfield, D.H. (2013) Quality Improvement, 9th Edition, Prentice Hall.
- M. Jeya Chandra (2020) Statistical Quality Control. CRC Press
- J.T. Burr (2020) Elementary Statistical Quality Control. 2nd Edition, CRC Press
- B. Donna, C. S. Summers (2010) Quality. 5th edition, Prentice Hall.
- D. Montgomery, D.C. (2012) Statistical Quality Control, 7th edition, John Wiley and Sons, Inc.

ENGINEERING LABORATORY 2 (BMIA 2121)

Course Learning Outcome

① Perform laboratory experiments on thermal fluid and dynamic.
② Write sufficient technical reports on thermal fluid and dynamic related experiments

Synopsis

The course is the practical introduction to the thermo-fluids and dynamics fundamentals. It offers the practical understanding of the basic concepts of fluid mechanics properties and thermodynamic laws. The course also covers the principles and theory in dynamics motions. For fluid mechanics the practical work related to fluid dynamic, Bernoulli principle and cyclic thermodynamic system. Meanwhile for dynamics part, Newton's Second Law, projectile motion, and moment of inertia principles are covered. Generally, the course will emphasis on the data collection skill, analyzing and critical thinking in presenting technical reports and implementing safe laboratory practice.

References

- Cengel, Y.A., Turner, R.H., Cimbala, J.M., (2016), 5th Edition in SI Units, "Fundamentals of Thermal-Fluid Sciences", McGraw Hill, New York.
- Kaminsky, D.A., Jensen, M.K., (2017), "Introduction to Thermal and Fluid Engineering", John Wiley & Sons, Inc
- Cengel, Y.A., Michael, A.B., (2019), th Edition, "Thermodynamics, An Engineering Approach", Mcgraw Hill, New York
- Ferdinand P. Beer, E. Russell Johnston Jr., Phillip J. Cornwell, 2015, Vector Mechanics for Engineers: Dynamics. 11th Edition, New York, Ny: Mcgraw-hill
- J.L. Meriam, L.G. Kraige, J.N. Bolton, 2018, Engineering Mechanics: Dynamics. 9th Edition, New York, Nj: John Wiley & Sons.
- Russell C. Hibbeler, 2017, Engineering Mechanics: Dynamics. 14th Edition, Prentice Hall.

INDUSTRIAL AUTOMATION (BMIA 3213)

Course Learning Outcome

① Apply knowledge in industrial automation system for control of automation processes and the machineries involved.
② Design PLC programmes to solve complex problems in automation using logic control and logic diagram.
③ Analyze an automated system that consists either of fluid power equipment, robot work cell, PLC, vision system or other types of automation tools.
④ Assess the design and performance of automated system components through practical configuration and simulation using lab equipment and software

Synopsis

This course introduces the fundamental concepts of automation technologies and the integration of automated systems. Students will study key automation components, including sensors, machine vision systems, electric motors, pneumatic systems, and hydraulic systems. The course also provides knowledge and practical exposure to the design and analysis of Programmable Logic Controllers (PLC) for solving complex automation problems. In addition, the course covers essential elements of automated systems, including industrial robotics, material handling technologies, flexible manufacturing systems, and the integration of automated manufacturing processes and equipment. Students will also gain an introductory understanding of current trends and developments in industrial automation.

References

- Mikell, P.G., 2019, Automation, Production Systems, and Computer Integrated Manufacturing, 5th Edition, Pearson.
- Nidhi Sindhwani, Rohit Anand, A. Shaji George, And Digvijay Pandey, 2024, Robotics and Automation in Industry 4.0, 1st Edition, Crc Press.

PRODUCT DESIGN AND MANUFACTURING (BMIR 3513)

Course Learning Outcome

① Apply the methodologies for product design as a means to develop an idea from concept through to production to satisfy customer needs.
② Apply environmental concerns in creating sustainable products.
③ Recommend suitable manufacturing processes associated with functional and product development requirements.
④ Demonstrate the ability to collaborate efficiently among team members.
⑤ Demonstrate the ability to communicate effectively both orally and writing project.

Synopsis

This course introduces the integration of design and manufacturing in creating a new product. Students will be exposed to the concepts and principles of product design as well as the best processes to manufacture a product. Knowledge of the economic factors influencing design such as product cost analysis and human engineering consideration in product design is also covered in this course. In addition, knowledge of the environmental impacts and issues on sustainability is also taught. The project in this course applies team-based approach to which will improve students teamwork and communication skills. Industrial talks delivered by experts from industry give the opportunity in sharing the working experience from the experts to the students.

References

- Ulrich, K. T. and Eppinger, S. D., 2019, Product Design and Development. 7th Edition. McGraw Hill.
- Chitale, A. K. and Gupta, R. C., 2013, Product Design and Manufacture. 6th Edition. Prentice Hall, New Delhi, India.
- Kalpakjian, S. and Schmid, S. R., 2014, Manufacturing Engineering & Technology. 7th Edition. Prentice Hall.
- Gibson, Ian, David W. Rosen, Brent Stucker, And Mahyar Khorasani. Additive Manufacturing Technologies. Vol. 17. Cham, Switzerland: Springer, 2021

MECHANICS OF MACHINE (BMIR 3313)

Course Learning Outcome

① Apply the basic principles of mechanics of rigid body on machines and its mechanism.
② Solve complex problems involving mechanisms, balancing, vibration, and power transmission through belts and gears.
③ Solve the mechanics of machines elements and their performance.

Synopsis

This is a 3-credit hour course offered to all third year Faculty of Manufacturing Engineering students. This course focuses on the principles of the mechanics of machines and their application in practice. It covers the basic concept of gear and belt drive, dynamic balancing, flywheel, governor, gyroscope, cams design and vibrations.

References

- Ramamurti, V., 2005, Mechanics of Machines, 2nd Edition, Alpha Science International Ltd, U.K.
- Roslan A. R., Che Abas C. I. and Mohd Yunus A., 2003, Mekanik Mesin, Universiti Teknologi Malaysia, Johor.
- Theory of Machines, Khurmi, R.S. and Gupta, J.K., 14th Edition, S. Chand & Co. Ltd., New Delhi, 2005.
- Hibbeler, R. C., Engineering Mechanics Dynamics, 13th Edition, Prentice Hall Inc., Singapore, 2013.
- Vinogradov, O., Fundamentals of Kinematics and Dynamics of Machines and Mechanisms, CRC Press, United States of America, 2000.

MATERIAL SELECTION (BMIB 3323)

Course Learning Outcome

① Explain the relationships between design requirements, materials properties, processing and product performance.
② Justify the suitability of a particular processing method for a specific selected material and design activity using data, charts and software.
③ Select the most appropriate materials and processes to be used for products fabrication and commercialization.
④ Communicate ideas relevant to materials selection analysis in product design and manufacturing.
⑤ Perform self-directed study in gaining new knowledge and skill.

Synopsis

This course integrates all types of engineering materials (metals, polymers, ceramics and composites) and its properties (modulus, strength, hardness and toughness etc.) for materials selection in any engineering design. Various processing techniques (shaping, joining and finishing etc.) are also summarized. Cooperative problem-based learning activities are used to reinforce the concept and capabilities in applying selection of materials utilizing materials properties charts, data and software.

References

- Ashby, M.F., 2016, Materials Selection In Mechanical Design, 5th Edition, Butterworth- Heinemann.
- Kenneth G.B., 2010, Engineering Materials: Properties and Selection, Prentice Hall.

CONTROL SYSTEMS (BMIA 3313)

Course Learning Outcome

① Construct mathematical models of dynamic systems.
② Analyze transient response, steady-state error and stability of first-order and second-order systems.
③ Design controllers for complex engineering problems.
④ Construct and numerically validate a control system using numerical software such as MATLAB / Simulink.

Synopsis

This course focuses on control system theory, design and analysis. Students will learn to construct mathematical model of dynamic systems such as translational and rotational mechanical systems and electromechanical systems as well as reduction of multiple subsystems. Students will also be introduced to control system theory on specifications of control systems that include transient response, stability and steady state error for first-order and second-order systems. Subsequently, students will also design classical controllers such as PI, PD, PID, lag, lead and lag-lead using root locus technique and frequency response technique. Fundamental knowledge in Laplace transform, linear algebra, Kirchoff's voltage, current laws and Newton's laws are essential to excel in this course.

References

- Nise, N. S., 2020, Control System Engineering, 8th Edition, John Wiley.
- Ogata, K., 2010, Modern Control Engineering, 5th Edition, Prentice Hall.
- Rafan, N.A and Kamsani, S.H, Control Systems Theory. Penerbit Universiti UTeM, Malaysia, 2015.
- Dorf, R.C And Bishop, R.H. Modern Control Systems, 13th Edition, Pearson Education Inc., United States of America, 2017.

ENGINEERING LABORATORY 3 (BMIP 3111)

Course Learning Outcome

① Model, simulate and analyze manufacturing systems by using state of the art discrete event simulation software.
② Perform computer-based simulations and technical report writing on human factors engineering/ ergonomics related to manufacturing industry environment.
③ Work cooperatively with group members, developing teamwork in the assigned activity.

Synopsis

With the very high cost of investment in manufacturing industries, it is very important that good decisions are made about buying and operating manufacturing systems. At the same time, the increasing complexity of manufacturing systems makes decision making more difficult: simulation is often the only way to gather the necessary information. Engineering Laboratory 3 consists of computer simulation work combining the simulation of manufacturing systems and human factors engineering (ergonomics). In the simulation of manufacturing system laboratory, students will deal with the simulation as a method to analyze and evaluate the operation or design of manufacturing processes and facilities. In the human factors engineering (ergonomics) computer laboratory, the students will be conducting two simulation works related to the topics what they have learned in the lectures. Examples of simulations include manikin and workspace, and human activity analysis.

References

- Jerry Banks, John Carson, Barry Nelson & David Nicol. Discrete Event System Simulation, Prentice-Hall, Inc. Upper Saddle River, New Jersey, 2001.
- Steffen Bangsow. Manufacturing Simulation with Plant Simulation and Simtalk – Usage and Programming with Examples and Solution. Springer, 2010.
- DELMIA – Digital Manufacturing and Production Virtual Ergonomics Solutions, version 5, Release 20, Dassault Systemes.

INDUSTRIAL ENGINEERING (BMIP 3423)

Course Learning Outcome

① Explain the fundamental concepts, tools and techniques applied in Industrial Engineering.
② Apply tools and techniques in Industrial Engineering.
③ Analyze and solve complex problems that are related to Industrial Engineering.
④ Evaluate manufacturing operation scenarios using Industrial Engineering tools and techniques.

Synopsis

This is 3-credit hours course offered to all third-year faculty of manufacturing engineering students. Students will be exposed to the concept of productivity and the various tools and techniques to improve productivity. Thus, emphasize on this course will be on improving productivity, efficiency and effectiveness in manufacturing. Initially, students will be exposed to forecasting, strategic capacity planning and facilities layout. The second part of this course will cover topics such as work system design, material requirements planning, inventory control and production scheduling. Lastly, the topic of lean manufacturing is covered.

References

- Heizer, J. and Render B., 2014, Principles of Operations Management, 9th Edition. Prentice Hall.
- Stevenson, W.J., Chuong, S.C., 2014, Operations Management: An Asian Perspective, 2nd Edition. McGraw Hill.
- Krajewski, L.J., Ritzman L.P., and Malhotra M. K., 2013, Operations Management: Processes and Supply Chains, 10th Edition. Prentice Hall.

CAD / CAM / CAE (BMIR 3223)

Course Learning Outcome

① Explain CAD/CAM/CAE systems and applications in manufacturing industry.
② Apply basic principle of CAD/CAM in creating 2D sketches, 3D models and CAM operation (milling and turning).
③ Analyze a mechanical design using finite element analysis method.
④ Optimize a mechanical design using finite element analysis method.

Synopsis

This course is an introduction to the CAD/CAM/CAE system and its application in industry. The students will be exposed to the application of the high-end CAD/CAM software (CATIA) and CAE software (ANSYS) for generating geometric modeling (2D and 3D) and the use of CAE software to analyze, evaluate and optimize the mechanical design. The course covers Geometric modeling Systems, Generative/ Interactive Drafting, CAD/ CAM Programming, Finite Element analysis using manual approach and using FEA software.

References

- N Rao, CAD/CAM Principles and Applications, 3rd Edition, McGraw Hill, 2010.
- Logan D.L., (2002) A First Course in the Finite Element Method, 3rd Edition, Brooks/Cole, Pacific Grove, CA.
- .Fred Karam, Using CATIA V5, Tomson (Delma Learning), 2004.

MANUFACTURING SUSTAINABILITY (BMIP 2122)

Course Learning Outcome

① Describe the sustainable development concepts, scope, and the impacts in aspects of manufacturing.
② Apply sustainable manufacturing, including the 6 R's, in relation to environmental regulations and the implications in business process.
③ Evaluate impact of manufacturing on economic, environment and social sustainability.

Synopsis

This course is designed to provide students with an understanding of sustainability issues, the concepts and the scope of Sustainable manufacturing (SM), the strategies in SM, the management approaches in SM, and tools commonly used in SM. In the current situation, integrating sustainability into business process will enhance business's total performance and competitiveness. Skills developed and knowledge acquired from this course will prepare students to be environmentally conscious engineers who are sensitive to environmentally, economic and social/ community related problems and capable to solve those problems and enhancing total performance of industries.

References

- Vezzoli, C. and Manzini, E., (2008), Design for Environmental Sustainability, Springer-verlag. Milan, Italy.
- Fabio, G., Rosa, G.L., and Risitano, A. (2006), Product design for the environment, Taylor & Francis Group, LLC.
- Mahmoud M. El-Halwagi (2012), Sustainable design through process integration: fundamentals and applications to industrial pollution prevention, resource conservation, and profitability enhancement, Oxford: Butterworth-Heinemann.

CNC MACHINING (BMIS 3613)

Course Learning Outcome

① Explain the principle of CNC systems, mechanics and dynamics of machine tool.
② Analyze CAD/CAM methodology in 2D, 3D, surface modeling and CAM operation.
③ Describe recognizable basic features of Computer Numerical Control (CNC) and CNC Programming.
④ Plan and analyze process planning for part machining.

Synopsis

This course introduces the principles of Computer Numerical Control (CNC), machine structures, planning for manufacture, part programming and CADCAM software operation. In this course the student is exposes to the CNC programming features of various CNC controls, the application of G and M codes, and mechanics and dynamics of machine tools.

References

- Mattson M., 2002, CNC Programming Principles and Applications. Delmar.
- Madison J., 1996, CNC Machining Handbook. Industrial Press Inc.
- Kip Hanson, 2018, Machining for Dummies. Wiley.

MANUFACTURING MANAGEMENT (BMIP 4413)

Course Learning Outcome

① Demonstrate principles of Project Management, Total Quality Management, Lean Manufacturing, Innovation Management, Manufacturing Strategy, and Supply Chain.
② Apply tools and techniques of Project Management, Total Quality Management, Lean Manufacturing, Innovation Management, Manufacturing Strategy, and Supply Chain.
③ Evaluate the best solutions for managing resources and cost implications.

Synopsis

This course covers management of manufacturing operations internally and externally. Project Management (PM), Total Quality Management (TQM), Lean Manufacturing (LM), and Innovation Management (IM) are management practices for internal issues such as project, quality, continuous improvements etc. Supply Chain Management (SCM) is management practices deal with external issues such as suppliers and logistics. Project Management covers techniques of planning and scheduling for project resources such as manpower, machines, money, and materials. Total Quality Management covers Product quality and its controls, creating quality by design, quality control of purchased product, quality control of manufacturing processes, the concept of Six Sigma, organizing effective quality management. Lean Manufacturing covers the tools and techniques applied in determining the LM baselines such as Where to start?; What to do next?; Exploit value stream; Develop metrics and measurements. Manufacturing Strategy covers strategic plan by Corporate Management, strategy for market winner, and strategy for choosing the process. Innovation Management covers the types of innovation; Research and Development management; Processes in innovation; Models of innovation. Supply Chain Management covers all processes in managing supply chain that caters the aspects of economy, environment, and social.

References

- Tony, M., 2012, 20:20 Project Management, Kogan Page.
- H. Lal, 2008, Organisational Excellence Through Total Quality Management, New Age International Pvt. Ltd.
- Bill, C., 2004, Lean Manufacturing That Works: Powerful Tools for Dramatically Reducing Waste and Maximizing Profits, AMACOM.
- Mark, D., David, M. Gann, and Ammon, S., 2008, The Management of Technological Innovation: Strategy and Practice, OUP Oxford.
- Joalle, M., 2013, Sustainable Supply Chain Management, John Wiley & Sons Incorporated.

INTRODUCTION TO INDUSTRIAL ENGINEERING (BMII 1112)

Course Learning Outcome

① Explain the fundamental principles and concepts of industrial engineering.
② Apply appropriate tools and techniques to solve problems related to industrial engineering.
③ Communicate effectively with team members through written reports and oral presentations on industrial engineering topics.

Synopsis

This is a 2-credit hours course offered to first year students of Industrial Engineering program. Through this course, the students will be exposed to fundamentals knowledge on industrial engineering such as plan layout, materials handling, work and time study, human factors and ergonomics, supply chain management, automation and social systems. Additionally, students will have direct observations of industries (experiential learning) to enhance their understanding of industrial engineering practices.

References

- William, J. S. and Sum, C. C., Operations Management, 14th Edition, McGraw-Hill Education, 2021
- Mikell P. Groover, Work Systems and the Methods, Measurement, And Management of Work. 8thedition, Pearson, 2017.
- Heizer, J. and Render, B. Operations Management: Sustainability and Supply Chain Management, 13th Ed., Pearson, 2020.

INTRODUCTION TO DATA SCIENCE (BMII 1313)

Course Learning Outcome

① Construct a data science solution.
② Measure the computing requirements appropriate to a data science problem.
③ Diagnose the computer program based on data science fundamental for problem solving.

Synopsis

This course delivers an essential exposure on the fundamental concepts and techniques of data science. It is divided into two parts. Part 1 is the introductory lecture and guided practical session for the first 6 weeks. The main topics covers the five important phases in understanding data science: introduction to data science, data wrangling, exploratory data analysis, data manipulation, applied machine learning, and data visualization and communication. Part 2 is a guided capstone project for another 9 weeks. The capstone project provides a platform to the students to apply their previously learn knowledge especially in artificial intelligent, statistics, analytics, project managements and data science in a real project setting. The last 3 weeks is the project presentation and technical report submission. There is no final written examination for this course.

References

- Emc Education Services (Ed.). (2015). Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, 1st Edition, John Wiley.
- Bengfort, B., & Kim, J. (2016). Data Analytics with Hadoop: An Introduction for Data Scientists. " O'Reilly Media, Inc
- Wickham, H., & Grolemund, G. (2016). R For Data Science: Import, Tidy, Transform, Visualize, And Model Data. " O'Reilly Media, Inc
- Grus, J. (2019). Data Science from Scratch: First Principles with Python. O'Reilly Media
- Wilke, C. O. (2019). Fundamentals Of Data Visualization: A Primer on Making Informative and Compelling Figures. O'Reilly Media

WORK SYSTEM DESIGN (BMII 2112)

Course Learning Outcome

① Explain the principles and terminology of work system, motion study, time study and work measurement, work management, and ergonomics principles
② Apply the model work systems using standard techniques, such as flow diagrams, process charts, operation charts, activity charts, block diagrams, and process maps, for purposes of work system documentation, analysis, and design.
③ Analyze the normal and standard times using several methods such as; Direct Time Study, Predetermined Time Standards, and Work Sampling.

Synopsis

This course concentrates the design of work systems in terms of human, machine and process operations. Method Study, selecting, recording/charting analysis and improving the methods by which tasks are performed will be covered as well as manufacturing process flow analysis, operation process charts, human machine interaction, hand process analysis and methods standardization. Work Measurement, methods of establishing the time for a manual task, stopwatch time study, predetermined time systems, standard data, work sampling will be examined. Human factors in workplace, including ergonomic factors in workplace design, accidents and injuries will also be covered. The emphasis is on how these methods are used to study, improve, and/or optimize a process/system and workplace.

References

- Mikell P. Groover, 2020 Work Systems and the Methods, Measurement, And Management of Work. 8th edition, Pearson
- Benjamin W. Niebel (1993) Motion and Time Study. 9th Edition, Irwin
- Jay Heizer, And Barry Render (2014), Operations Management: Sustainability and Supply Chain Management. Pearson

FACILITIES PLANNING AND DESIGN (BMII 3323)

Course Learning Outcome

① Explain the fundamental concepts, tools and techniques applied in facilities planning and design
② Apply tools and techniques in facilities planning and design.
③ Analyze related problems to facilities planning and design.
④ Evaluate facilities operation using facilities planning and design tools and techniques

Synopsis

This is a 3-credit hours course offered to all third-year students in program of Bachelor of Industrial Engineering at Faculty of Manufacturing Engineering. The students will be exposed to the tools and techniques in planning and design of facilities. In the early stage of the course, the students will be exposed to defining facilities requirements, product, process and schedule design, flow systems, activity relationship and space requirements and personnel requirements. Subsequently, this course will cover topics such as material handling, layout planning model and design algorithms, warehouse operations, manufacturing systems, facilities systems, quantitative facilities planning models, evaluating and selecting facilities plan.

References

- James A. Tompkins, John A. White, Yavuz A. Bozer, J.M.A. Tanchoco (2010) Facilities Planning, 4th Edition, John-Wiley and Sons.
- Cotts, D.G., Roper K.O., Payant R.P. (2010) The Facilities Management Handbook, 3rd Edition, Library of Congress.
- Hans-peter Wiendahl, Jürgen Reichardt, Peter Nyhuis (2015) Handbook Factory Planning and Design, Springer.
- Alberto Garcia-diaz, J. Macgregor Smith (2014) Facilities Planning and Design, Pearson Education Limited.

OCCUPATIONAL SAFETY AND HEALTH (BMII 2222)

Course Learning Outcome

① Explain the different requirements and regulations of Act (A1648 Occupational Safety and Health Act Amendment 2022)
② Identify various safety, health, and environment hazards that affect human being.
③ Apply various requirements on safety and health principles on working environment.

Synopsis

The aim of this course is to expose students to industrial Laws and regulations in Malaysia specifically Factory and Machinery Act, Occupational Safety and Health Act. Students will be taught on safety, health and environmental hazard that affects human being. The skills and knowledge of this area are crucial for students to accommodate them in the future.

References

- Occupational Safety and Health (Amendment) Act 2022.
- Reese, C. D. (2015). Occupational Health and Safety Management, A Practical Approach. Lewis Publishers, 3rd Edition, A CRC Press Company.
- Factory and Machinery Act 1974.
- Goetsch, D. L. (2018). Occupational Safety and Health for Technologists, Engineers, and Managers, 9th Edition, Upper Saddle River, NJ: Prentice Hall.

SYSTEM MODELLING: SIMULATION AND COMPUTING (BMII 3263)

Course Learning Outcome

① Describe the principles and techniques of simulation in manufacturing system.
② Apply discrete event simulation techniques to model industrial system.
③ Propose solutions to engineering problems based on analysis of simulation and computing.

Synopsis

Simulation is a powerful system tool for analyzing a wide variety of complex engineering and business problems. This course introduces the students to principles and techniques of discrete event simulation. The emphasis is on problem formulation, building conceptual models and using appropriate statistical methods for the input modeling, validation, verification and output analysis of simulation models. The course will also discuss applications of simulation and related issues for current and future manufacturing systems.

References

- Banks, J., Carson, J. S., Nelson, B. L., Nicol, D. M., 2013, Discrete-Event System Simulation (5th Edition), Prentice Hall.
- Law, Averill, 2024. Simulation Modeling And Analysis, 6th Edition. Mcgraw Hill.
- Bangsow, S., 2020. Tecnomatix Plant Simulation. Springer International Publishing
- Brailsford, S., Churilov, L. And Dangerfield, B. Eds., 2014. Discrete-event Simulation and System Dynamics for Management Decision Making. John Wiley & Sons
- Choi, B.K, Kang, D., 2013. Modeling And Simulation of Discrete-event Systems. John Wiley

OPERATION RESEARCH (BMII 3123)

Course Learning Outcome

① Formulate operational problem in mathematical modeling.
② Apply linear programming, transportation, assignment and queueing techniques to solve complex operation planning.
③ Evaluate alternative solutions for decision making through sensitivity and what-if-scenario analyses.

Synopsis

Decision-making problems are very common in industrial operation planning as industry needs to make the most effective use of an organization's resources. Resources in organization such as machinery, money, energy, labor force are elements to make products or services. These resources are limited; managers need to deal with these limitations. Operation research deals with the application of analytical techniques to solve complex problems posed by organizational operations. Linear programming is one of the techniques discussed, which is widely used, based on mathematical technique to help managers plan and make decisions necessary to allocate resources. This course covers principles and practices, tools and techniques, fundamentals of optimisation problem in industrial engineering. It discusses mathematical formulation of production or operational problems and solve them using linear programming and other optimisation techniques. This course consists of two parts; part i - linear programming technique: part ii: transportation models, and network models.

References

- Hamdy, A.Taha., Operation Research: An Introduction, 11th Edition, 2022.
- Hillier, F. & Lieberman, G. J., Introduction to Operation Research. 11th ed. McGraw-Hill, 2021.
- Ignizio J.P., Linear Programming in Single & Multiple Objective Systems, Prentice Hall 2007.

HUMAN FACTORS ENGINEERING (BMII 2223)

Course Learning Outcome

① Describe human capabilities and limitations in performing jobs activities.
② Apply basic human factor principles and assessment to minimize occupational injuries in the workplace
③ Design a work system by taking into consideration human capabilities as limitations
④ Analyze the effectiveness of a work system and workplace designed.

Synopsis

This course provides students with the rationale for providing an occupationally safe and healthy work environment in industry. Three main elements of this course are: human, equipment and work environment. These elements are classified into different areas; however, correlations of them are discussed and exemplified in each topic. Through human study, students will be explained about the human anthropometric, physiology, psychology as well as capabilities and limitations of human. Meanwhile, through ergonomic design of equipment, students will learn on how to design the hand tools and workstations that are safe to the users. Students are also exposed to management of work environment such as thermal comfort, noise, etc. resulting in better understanding of occupational health in industries.

References

- Stephen J. Guastello (2023). Human Factors Engineering and Ergonomics. Routledge And Crc Press.
- John D. Lee, Christopher D. Wickens, Yili Liu, Linda Ng Boyle (2017). Designing For People: An Introduction to Human Factors Engineering 3rd Edition
- McPhee, B. (2005). Practical Ergonomics. Human Factors at Work. Coal Services Health and Safety Trust, Sydney.
- Ergonomics Risk Assessment Guideline by Department of Occupational Safety and Health Malaysia
- Wickens, C. D., Gordon, S. E., Liu, Y., & Lee, J. (1998). An introduction to human factors engineering.

CLOUD MANUFACTURING (BMIG 4123)

Course Learning Outcome

① Identify the characteristics, drivers and enablers of CM in comparison to previous manufacturing paradigms.
② Apply the knowledge of the systems and technologies related to CM to create basic CM framework for specific platforms.
③ Analyze the opportunity and challenges of CM based on case study.

Synopsis

Cloud Manufacturing (CM) is the latest manufacturing paradigm that enables manufacturing to be looked at as a service industry. The aim is to offer manufacturing as a service so that an individual or organization that intends to manufacture products can utilize this service and do not have to make capital investment in manufacturing infrastructure. CM is enabled by the advancements in IT that 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. This provides immense flexibility in process and logistical planning. Digital platforms in the CM provides perfect canvas for inventing new business models and for intelligent algorithms to analyze data and derive knowledge for operationalize use by cyber physical systems. This course provides comprehensive coverage on CM, among others, the role of data, manufacturing systems, various cyber physical technologies, applications and case studies. In addition to that, input from researchers and practitioners on the opportunities and challenges brought about by CM will also be covered so that organizations can be better prepared to reap the benefits of this latest manufacturing paradigm.

References

- Liu, Y., Wang, L. And Wang, X.V., 2018. Cloud Manufacturing: Latest Advancements and Future Trends. Procedia Manufacturing, 25(8), Pp.62-73.*
- Henzel, R., & Herzwurm, G., 2018. Cloud Manufacturing: A State-of-the-art Survey of Current Issues. Procedia Cirp, 72, 947-952
- Ezell, S., & Swanson, B., 2017. How Cloud Computing Enables Modern Manufacturing. American Enterprise Institute.
- Wu, D., Greer, M.J., Rosen, D.W. And Schaefer, D., 2013. Cloud Manufacturing: Strategic Vision and State-of-the-art. Journal of Manufacturing systems, 32(4), Pp.564- 579.

LEAN SIX SIGMA (BMIP 4323)

Course Learning Outcome

① Describe principle of Lean Manufacturing and Six Sigma.
② Apply appropriate tools and techniques of Lean Six Sigma for complex industrial problems.
③ Evaluate the source of production waste using Six Sigma approach.
④ Construct improvement strategy through the combination of Lean and Six Sigma concept.

Synopsis

Lean Management course provides fundamental thinking of the principle of eliminating production waste. Understanding the Lean Thinking is essential in order success in implementing the lean principles. In the meantime, Six Sigma approach emphasizes the importance of controlling variation in process. As a result, the Six Sigma approach able to control defects at only 3 pieces per million production quantity. Thus, combination of Lean tools & techniques and Six Sigma approach would be able to enhance productivity and quality.

References

- Aristide Van Aartsengel And Selahattin K., Handbook of Continuous Improvement Transformation: The Lean Six Sigma Framework and Systematic Methodology for Implementation, Springer, 2013.
- Marc S., Dara S., Ray Q.C. And Vicky C.G., Topics in Lean Supply Chain Management – Chapter 1: Lean, 2nd Edition, World Scientific, 2018
- William M.F., Lean Manufacturing: Tools, Techniques and How to Use Them, CRC Press, 2001.

SUPPLY CHAIN AND LOGISTICS MANAGEMENT (BMII 4122)

Course Learning Outcome

① Demonstrate the systematic and in-depth understanding of the issues in supply chain and logistics management.
② Analyze appropriate tools, techniques and technologies to evaluate and explore managerial approaches for complex industrial problems.
③ Evaluate in writing and presentation in terms of fundamentals, concepts, issues and managerial approaches in each supply chain case study in terms of its design, planning and operations.

Synopsis

This course will help the students to understand how to plan, implement and manage the flow of goods, services and related information to customers, in a process known as supply chain management, which to be an engineer, such information must be able to comprehend. Students will also acquire knowledge of the associated tools and techniques employed within the supply chain management, including forecasting, planning, inventory and distribution, together with the strategic and management aspects of supply chain management. This is principally related to manufacturing industries that works within and using concepts such as strategies, alignment, working within networks, purchasing, partnerships, collaboration, communication, coordination and new business models. Students will be able to discuss in the group research in terms of a particular industry from a strategic standpoint, to determine important competitive aims and the supply chain techniques that are applied within that industry. A group presentation on such findings will be made near the end of the course.

References

- Chopra, S and Meindl, P (2016), Supply Chain Management: Strategy, Planning and Operation, 6th Edition, Global edition, Pearson. ISBN 9781292093574, 9781292093567
- Harrison, A, Skipworth H, Van Hoek R, Aitken J (2019), Logistics Management and Strategy: Competing through the Supply Chain, 6th Edition, Global Edition, Pearson. ISBN-10: 1292183683 • ISBN-13: 9781292183688
- Slack, N and Lewis, M (2002), Operations Strategy, 2nd Edition, Prentice Hall, ISBN 000-0-273-63781-9

PRODUCTION PLANNING AND INVENTORY CONTROL (BMII 3153)

Course Learning Outcome

① Explain fundamentals knowledge in production planning and inventory control.
② Apply appropriate tools or techniques in solving problems related to production planning and inventory control.
③ Analyze various production planning and inventory control scenarios.

Synopsis

This is a 3-credit hours course offered to second year students of industrial engineering program. In this course, the students will be taught fundamentals knowledge on production planning and inventory control such as forecasting, inventory management, aggregate and capacity planning, scheduling, material requirement planning, and just-in-time. Furthermore, students will be exposed to various challenges or issues in manufacturing and service sectors related to production planning, and inventory Control.

References

- Nahmias, S. (2014) Production Operations Analysis. Mc Graw Hill/ Irwin. 6th Edition
- Stevenson, J. William (2021) Operation Management. Mc Graw Hill/ Irwin. 14th Edition
- Vollman, T.E., Berry, W.L. Whyback, D.C. and Jacobs, F.R. (2005). Manufacturing Planning and Control for Supply Chain Management. 5th Edition. Mc Graw Hill/Irwin
- Stephen, N.C. (2005). Fundamentals of production Planning and Control. Prentice Hall.
- Krawjewski J.L. and Ritzman P. L., (2002), Operations Management: Processes Value Chains. 7th Edition, Prentice Hall International Series.

ELECTIVE 1 BMIG

INTRODUCTION TO DATA SCIENCE (BITI 2513)

Course Learning Outcome
① Analyze data science problem.
② Define the computing requirements appropriate to a data science problem.
③ Demonstrate computer programme based on data science fundamental for problem solving.
④ Analyze the effectiveness of a work system and workplace designed.

Synopsis
This course delivers an essential exposure on the fundamental concepts and techniques of data science. It is divided into two parts; Part 1 is the introductory lecture and guided practical session for the first 5 weeks. The main topics cover the five important phases in understanding data science; introduction to data science, data wrangling, exploratory data analysis, data manipulation, applied machine learning and data visualization and communication. Part 2 is a guided capstone project for another 9 weeks. The capstone project provides a platform to the students to apply their previously learn knowledge especially in Artificial Intelligent, AI, statistics, analytics, project managements and data science in a real project setting. The last 3 weeks are the project presentation and technical report submission. There is no final written examination for this course.

References

- EMC Education Services, Ed. (2015) Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, 1st Ed., John Wiley.
- Thomas, E., Wajid, K. & Paul, B. (2016) Big Data Fundamentals: Concepts, Drivers & Techniques, 1st Ed., Prentice Hall.
- Nolan, D. & Lang, D. T. (2015) Data Science in R: A Case Studies Approach to Computational Reasoning and Problem Solving, CRC Press.
- Donoho, D. (2015) 50 Years of Data Science, available at: http://courses.csail.mit.edu/18.337/2015/docs/50YearsDataScience.pdf [Accessed on 12 February 2016].
- Kabacoff, R. (2015) R in Action: Data Analysis and Graphics with R, 2nd Ed., Manning Publications.

HUMAN COMPUTER INTERACTION (BITM 2313)

Course Learning Outcome
① Apply the concepts and theories of human computer interaction (HCI) in system development.
② Show conceptual thinking in problems solving related to application, website or product design.
③ Follow to the usability evaluation activities.

Synopsis
This course introduces the concept of HCI and its relationship in system development. The topics include the basic understanding of cognitive psychology, user interface design, interaction design, usability and evaluation. Other topics such as user-centered design, task analysis and user support design are also covered. The current issues on accessibility and localization are also discussed at the end of this course.

References

- Preece, J., Rogers, Y. & Sharp, H. (2015) Interaction Design: Beyond Human-Computer Interaction, 4th Ed., John Wiley & Sons.
- Dix, A., Finlay, J., Abowd, G. D. & Beale, R. (2005) Human-Computer Interaction, 3rd Ed., Prentice Hall.
- Dov Te'eni, D., Jane Carey, J. & Zhang, P. (2007) Human Computer Interaction: Developing Effective Organizational Information Systems, John Wiley & Sons.

- Preece, J., Rogers, Y., Sharp, H., Holland, S., Carey, T. & Benyon, D. (1994) Human-Computer Interaction, Addison Wesley.
- Roojen, P. V. (2006) Sign and Symbols, The Pepin Press.
- Frase, T. & Banks, A. (2004) The Complete Guide to Colour, ILEX Press Limited.
- Hay, G. (2004) Activity-Centered Design: An Ecological Approach to Designing Smart Tools and Usable Systems, The MIT Press.

INFORMATION TECHNOLOGY SECURITY (BITS 3423)

Course Learning Outcome

① Explain the concept and issues of information technology security.
② Distinguish the suitable components in providing security services and mechanism in computer software, operating system, database and network system.
③ Manipulate an appropriate security system mechanism ethically.

Synopsis

Security in information technology is a very important issue. It is an area that deserves study by computer professionals, students, and even many computer users. Through this course, students will be able to learn security services that covered Confidentiality, Integrity and Availability (CIA) in ICT based systems. This course also highlights use of cyberlaw in protecting user rights. Finally, students will be able to learn methods in disaster recovery plan.

References

- Goodrich, M., & Tamassia, R. (2013). Introduction to Computer Security. International Edition. Pearson Education.
- Stallings, W. (2014). Network Security Essentials: Applications and Standards (5th ed.). Pearson Education.
- Pfleeger, C. P., & Pfleeger, S. L. (2011). Analyzing Computer Security: A Threat/Vulnerability/Countermeasure Approach (1st ed.). Prentice Hall.
- Gollmann, D. (2011). Computer Security (3rd ed.). John Wiley & Sons.

CLOUD MANUFACTURING (BMIG 4123)

Course Learning Outcome

① Identify the characteristics, drivers and enablers of CM in comparison to previous manufacturing paradigms.
② Apply the knowledge of the systems and technologies related to CM to create basic CM framework for specific platform.
③ Analyze the opportunity and challenges of CM based on case study.

Synopsis

Cloud Manufacturing (CM) is the latest manufacturing paradigm that enables manufacturing to be looked at as a service industry. The aim is to offer manufacturing as a service so that an individual or organization that intends to manufacture products can utilize this service and do not have to make capital investment in manufacturing infrastructure. CM is enabled by the advancements in IT that have resulted in immense improvements in computational power across nearly all electronic devices and enhanced capabilities in connecting the dots in an increasingly networked society. This provides immense flexibility in process and logistical planning. Digital platforms in the CM provide perfect canvas for inventing new business models and for intelligent algorithms to analyze data and derive knowledge for operationalize use by cyber physical systems. This course provides comprehensive coverage on CM, among others, the role of data, manufacturing systems, various cyber physical technologies, applications and case studies. In addition to that, input from researchers and practitioners on the opportunities and challenges brought about by CM will also be covered so that organizations can be better prepared to reap the benefits of this latest manufacturing paradigm.

References

- Weidong Li and Jörn Mehnen, Eds. Cloud Manufacturing: Distributed Computing Technologies for Global and Sustainable Manufacturing. Springer Science & Business Media, 2013
- Cloud-Based Design and Manufacturing (CBDM): A Service-Oriented Product Development Paradigm for the 21st Century, Schaefer, Dirk, 2014, 1st Edition, Springer.

INTELLIGENT SYSTEM (BMIA 4123)

Course Learning Outcome

① Discuss the solutions to manufacturing issues based on various techniques in computational intelligence.
② Explain the operational performance of different methods in artificial intelligence applied in manufacturing system.
③ Devise an intelligent system for an application in a manufacturing system.

Synopsis

This course introduces the theory and concepts of artificial intelligence. It examines the structure of the current techniques of computational intelligence applied in a manufacturing system. The prospects of intelligent systems in manufacturing operations will be discussed. The implementation of computational intelligence in actual practices will be carried out.

References

- Michael Negnevitsky (2005). Artificial Intelligence: A Guide to Intelligent Systems, 2nd edition, China: Addison Wesley.
- Russel, S.and Norvig, P., 2003, Artificial Intelligence – A Modern Approach, 2nd Edition, Prentice Hall.
- Tsoukalas, L.H. and Uhrig, R.E., 1997, Fuzzy and Neural Approaches in Engineering, Edition, Wiley- Interscience.

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MACHINE LEARNING (BMIA 4413)

Course Learning Outcome

① Differentiate the fundamental concept of machine learning theory.
② Select the appropriate techniques in machine learning problem solving.
③ Demonstrate machine learning algorithm based on machine learning concepts.

Synopsis

Students are exposed to the foundation of Machine Learning, which is the study of how to build a computer system that earns from experience. The course starts with an overview of data mining for background study. Main topics that will be covered are concept learning, decision tree learning, Bayesian leaning, Linear model, instance-based learning, model evaluation, association analysis and reinforcement learning. Besides, some applications of Machine Leaning including face recognition, bioinformatics, speech recognition, prediction problem, web data processing and application in manufacturing industry will be introduced.

References

- Flach, P., (2012), Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Cambridge University Press.
- Kelleher, J.D., Namee, B.M., D’Arcy A., (2015), Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies, The MIT Press
- Stephen Marsland (2014), Machine Learning: An Algorithmic Perspective, 2nd Edition, Chapman & Hall/CRC Machine Learning & Pattern Recognition
- Bonaccorso, G. (2018). Mastering machine learning algorithms: Expert techniques to implement popular machine learning algorithms and finetune your models.
- Yuxi (Hayden) Liu, (2020), Python Machine Learning By Example: Build intelligent systems using Python, TensorFlow 2, PyTorch, and scikit-learn, 3rd Edition 3rd Edition.

OBJECT ORIENTED PROGRAMMING (BMIA 4513)

Course Learning Outcome

① Explain the concepts and terminology of object-oriented programming using C++ language such as classes, inheritance and polymorphism.
② Develop programs in C++ language using object- oriented programming to solve robotics related problems.
③ Construct settings and configurations to interface PC-based controller with sensors and actuators using communication port in a manufacturing system environment.

Synopsis

Object-oriented programming (OOP) is a method of programming based on a hierarchy of classes, and well-defined and cooperating objects. This course approaches C++ programming in a straightforward, practical and simplified manner using mostly short programs that are clearly explained. Students are introduced to objects, classes, inheritance, interfaces, and packages. In addition, some areas of electronics integral to a wide range of modern technologies are also explored.

References

- Katupitiya, J., Bentley, K.,(2006) Interfacing with C++, Programming Real-World Applications, 1st Edition, Springer.
- Deitel, H.M., Deitel, P.J.,(2003) C++ How to Program, 4th Edition, Prentice Hall Josuttis, N.M. (2003) Object-Oriented Programming in C++, 1st Edition, Wiley.

ADDITIVE MANUFACTURING (BMIR 4613)

Course Learning Outcome

① Explain the processes, the limitations and areas of application of various Additive Manufacturing (AM) technologies.
② Illustrate the design factors that influence choice of appropriate AM technology on product development.
③ Analyse the principles of various AM technologies and their influence on product development.
④ Develop a product with the appropriate AM technology.

Synopsis

Additive manufacturing (AM), also known as 3D printing, is transforming how products are designed, produced, and serviced. Additive manufacturing is a process in which a three-dimensional computer model design is built into a physical object by joining thin layers of material. AM is a versatile field that encompasses a variety of methods, materials, and applications. AM lets us produce parts on-demand, without dedicated equipment or tooling. That unparalleled flexibility unlocks digital design tools that can create complex parts with breakthrough performance. Many companies are starting to recognize the benefits additive manufacturing (AM) offers in terms of speed, simplicity, reliability, and cost. But knowledge of the fundamental principles of AM, its applications, and its implications is one of the main barriers to its rapid adoption. The course will introduce the concepts of various AM techniques. It will emphasis the strengths and weaknesses of the various technologies and will highlight applications and case studies from the AM industry.

References

- Gibson I., Rosen D.W., Stucker B., Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing by New York, NY: Springer, 2015.
- Chua C. K., Leong K. F., Lim C.S., Rapid Prototyping: Principles and Applications, 3rd ed., Singapore: World Scientific Pub., 2015.
- T.S. Srivatsan, T.S. Sudarshan (2015), Additive Manufacturing: Innovations, Advances, and Applications, CRC Press, Taylor and Francis Group.

ELECTIVE 2 BMIG

INDUSTRIAL ERGONOMICS (BMIP 4113)

Course Learning Outcome

① Describe human capabilities and limitations in performing jobs activities.
② Apply basic ergonomic principles and assessment to minimize occupational injuries in the workplace.
③ Design a work system by taking into consideration human capabilities as limitations.
④ Analyze the effectiveness of a work system and workplace designed.

Synopsis

This course provides students with the rationale for providing an occupationally safe and healthy work environment in industry. Three main elements of this course are: human, equipment and work environment.; their correlations are discussed and exemplified in each topic. Through human study, students will explain about the human anthropometric, physiology, psychology as well as capabilities and limitations of human. Meanwhile, through ergonomic design of equipment, students will learn on how to design the hand tools and workstations that are safe to the users. Students are also exposed to management of work environment resulting in better understanding of occupational health in industries.

References

- McPhee, B. (2005). Practical Ergonomics. Human Factors at Work. Coal Services Health and Safety Trust, Sydney.
- Ergonomics Risk Assessment Guideline by Department of Occupational Safety and Health Malaysia
- Wickens, C. D., Gordon, S. E., Liu, Y., & Lee, J. (1998). An introduction to human factors engineering.

INDUSTRIAL ROBOTICS (BMIA 4113)

Course Learning Outcome

① Explain the components of robots, their structures and applications in manufacturing industry.
② Explain the role of forward and inverse kinematics in robot arms.
③ Analyze the planned trajectory of a robot arm in a production cell.
④ Devise the motion controls of a robot arm in a production cell.

Synopsis

The course aims at delivering a basic knowledge of robotics with an emphasis on the understanding of robotic concepts. The topics include the components of robots, their structure, applications in manufacturing system, and the role of forward and inverse kinematics in robot arms. The planned trajectory of a robotic system and the motion control of a robot arm in a production cell will be investigated as well.

References

- Niku, S. B., 2010, Introduction to Robotics Analysis Systems Applications, Prentice Hall.
- Rehg, J. A., 2003, Introduction to Robotics in CIM Systems, 5th Edition, Prentice Hall.
- Craig, J.J., 2013, Introduction to Robotics: Mechanics and Control, Pearson Prentice Hall.

MODELING AND SIMULATION (BMIP 4313)

Course Learning Outcome

① Describe the principles and techniques of simulation in manufacturing system.
② Apply simulation techniques to design and construct discrete event simulation models.
③ Analyse and evaluate simulation model by applying statistical analysis.

Synopsis

Simulation is a powerful system tool for analyzing a wide variety of complex engineering and business problems. This course introduces the students to principles and techniques of discrete event simulation. The emphasis is on problem formulation, building conceptual models and using appropriate statistical methods for the input modeling, validation, verification and output analysis of simulation models. The course will also discuss applications of simulation and related issues for current and future manufacturing systems.

References

- Banks, J., Carson, J. S., Nelson, B. L, Nicol, D. M., 2010, Discrete-Event System Simulation (5th Edition), Prentice Hall.
- Leemis, Lawrence, M., Park, Stephen K., 2006. Discrete-Event Simulation. A First Course. Pearson International Edition.
- Robinson, S., 2004, Simulation: The Practice of Model Development and Use, John Wiley & Sons

GREEN MATERIALS AND BIOMATERIALS (BMIB 4713)

Course Learning Outcome

① Describe the types of green materials and biomaterials.
② Relate the materials' properties with their structure and processing methods.
③ Recommend suitable processing methods with their potential applications.

Synopsis

The course focuses into green materials and biomaterial. The first half of the course focuses on biomaterials topics - their properties, compatibility and toxicity requirement, processing methods, in- vitro and in-vivo testing and their application. The second half of the course introduces basic concepts of working with green materials such as degradable and recycled materials. It covers the introduction to biodegradability and recycling, types and properties of these materials and well as their applications and limitations. It emphasizes the processing methods of biodegradable materials and recycled materials such as polymer and composite for sustainable applications.

References

- Johnson, B. M. & Berkel, Z. E., 2 0 1 1, Biodegradable Materials: Production, Properties and Applications, Nova Science Pub Incorporated.
- Mantia, F.L., 2002, Handbook of Plastics Recycling, Rapra Technology Limited.
- Holand, W. & Beall, G.H., 2012, Glass Ceramic Technology, WILEY.
- Schmitz, C., 2007, Handbook of Aluminium Recycling, Vulkan-Verlag GmbH.
- Hollinger, J. O., 2011, an Introduction to Biomaterials: Biomedical Engineering, CRC Press.

METAL PROCESSING TECHNOLOGIES (BMIS 4513)

Course Learning Outcome

① Utilize the knowledge and understanding of strength aspects on various metallic materials and impact of additive material.
② Conduct the work procedures for the design of welding, casting and sheet metal products.
③ Determine constructive design; static and dynamic design of welding, casting and sheet metal products.
④ Recognize the optimization techniques for welding, casting and sheet metal products.

Synopsis

This course is an extension to manufacturing process. Three major manufacturing processes, namely welding, casting and sheet metal are covered in details. Topics include strength of various metallic construction materials; work procedures for the design of welding, casting and sheet metal products; constructive design; static and dynamic design of welding, casting and sheet metal products; impact of additive material; optimization selection of materials, additive, parameters etc. Also included are optimization of quality and costs ability to formulate new standards, rules and procedure specifications for welding, casting and sheet metal products.

References

- Norrish, J., 2006, Advanced Welding Processes (New Manufacturing Processes).
- Easwaran, J., 2007, Advanced Casting Technology ASM International.
- Remus, T., 2003, Advanced Sheet Metal Fabrication, Wolfgang Publications.

ADVANCED MATERIALS (BMIB 4113)

Course Learning Outcome

① Classify different types of advanced materials based on their novel functions and properties.
② Relate the smart properties of materials to their molecular structures.
③ Select the appropriate advanced material for a specific application considering its properties and limitations.

Synopsis

This course introduces various types of advanced materials to students by addressing their structures, properties and applications. It intends to provide students with understanding of the basic principles of some important advanced materials. The advanced materials covered in this course are smart materials which include piezoelectric materials, shape memory alloys and polymers, electroactive polymers, as well as other types of advanced materials such as lightweight materials, advanced composite, superconductors and advanced coating.

References

- Leo, D.J., 2007, Engineering Analysis of Smart Material Systems, John Wiley & Sons, Inc.
- Srinivasan, A.V., & McFarland, D.M., 2001, Smart Structures Analysis and Design, Cambridge University Press.
- Martin, P.M., 2005, Handbook of Deposition Technologies for Films and Coatings, Elsevier Inc.

SPECIAL TOPICS IN MANUFACTURING ENGINEERING (BMIG 4443)

Course Learning Outcome

① Explain the concepts or terminology of special topics in Manufacturing Engineering.
② Solve problem related to special topics in Manufacturing Engineering.
③ Present or write report related to special topics in Manufacturing Engineering.

Synopsis

This elective course, exclusively for outbound mobility students, is relevant to any manufacturing engineering disciplines, including but not limited to materials, robotics and automation, manufacturing processes, design, and management.

References

According to special topics taught in the host university

ELECTIVE 3 BMIG

INDUSTRIAL DRIVES SYSTEM (BMIA 4323)

Course Learning Outcome

① Explain the principles, constructions and application of components in drives system.
② Analyze operational performances of drives system.
③ Design an industrial drives system.

Synopsis

Topics include electro-mechanical, pneumatic, and hydraulic drive components and systems with emphasis on selection, application, and proper installation techniques. The fundamental knowledge and theory of major components in fluids power and technologies, namely hydraulics and pneumatics, as well as electro motors, servo and stepper motors in robotics are covered. This includes the different types of actuators of linear and rotary configurations. Machine safety, torque, power, efficiency, bearings and couplings are also addressed. Characteristics of mechanical power train such as belt drives, chain, drives and gear drives are included as well. Moreover, basic concept of electric drives systems, with emphasis on system analysis and application, is also discussed in this subject. Installation, alignment, and maintenance of various drive systems are performed utilizing industrial equipment.

References

- K. T. Chau, Zheng Wang, 2011, Chaos in Electric Drive Sys-tems Analysis Control & Application, 1st Ed., Wiley.
- Esposito, A., 2009, Fluid Power with Applications, 7th Edition, Prentice Hall.
- Rabie, M. G., 2009, Fluid Power Engineering, McGraw-Hill.

MATERIALS CHARACTERIZATION (BMIB 4123)

Course Learning Outcome

① Summarize the fundamentals of materials characterization including the theory, working principle and application.
② Characterize materials structure and chemical element through interpretation and analysis of characterization output.
③ Display good communication skill on matters related to materials characterization in a written report and presentation.

Synopsis

This course focuses on material characterization techniques, covering their theoretical foundations, operating principles, and practical applications. Analytical methods include microstructural characterization using Optical Microscopy (OM), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), and Scanning Probe Microscopy (SPM). The course also covers phase analysis using X-ray Diffraction (XRD) and X-ray Fluorescence (XRF), thermal analysis techniques such as Thermogravimetric Analysis (TGA), Differential Thermal Analysis (DTA), and Differential Scanning Calorimetry (DSC), as well as spectroscopic characterization methods including X-ray Spectroscopy and Vibrational Spectroscopy.

References

- Leng, Y., 2008, Materials Characterization Introduction to Microscopic and Spectroscopic Methods), John Wiley & Sons.
- Brandon, D. and Wayne. D. K., 2008, Microstructural Characterization of Materials, John Wiley & Sons.
- B.D. Cullity, S.R. Stock, 2001, Elements of X- Ray Diffraction, 3rd Ed. Prentice Hall.

PRODUCTION OPTIMIZATION (BMIP 4123)

Course Learning Outcome

① Formulate production planning problem in mathematical modeling.
② Apply linear programming, transportation, assignment and queueing techniques to solve complex production planning.
③ Analyze alternative solutions for decision-making process in the manufacturing industry.
④ Evaluate decisions through sensitivity analysis and apply what if scenarios as a tool for alternative solutions.

Synopsis

Optimization in production is a common problem as industry needs to make the most effective use of an organization's resources. Resources in organization such as machinery, money, energy, labor force are elements to make products. These resources are limited; managers need to deal with these limitations. Linear programming is one of the techniques discussed, is widely used, based mathematical technique to help manager plan and make decisions necessary to allocate resources. This course covers principles and practices, tools and techniques, fundamental of optimization problem in manufacturing engineering. It discusses mathematical formulation of production or operational problems and solve them using linear programming and other optimization techniques. This course consists of two parts; Part I - Linear programming technique: Part II: Transportation models, assignment models and Queueing technique.

References

- Hamdy, A.Taha., 2017, Operation Research: An Introduction, 10th Edition.
- Hillier, F. & Lieberman, G. J., 2010, Introduction to Operation Research. 9th ed. McGraw-Hill.
- Ignizio J.P., 2007, Linear Programming in Single & Multiple Objective Systems, Prentice Hall.

PRODUCTION TOOL DESIGN (BMIR 4223)

Course Learning Outcome

① Explain the basic principles of production tools design in manufacturing field.
② Apply the basic principles of production tool design with current industrial practice.
③ Design the efficient production tools for manufacturing, assembly and inspection processes.

Synopsis

This course introduces the basic principles and methods of production tools design, such as jigs and fixtures for material removal processes, manual work operations, joining processes, and inspection processes. The student will be exposed to the process of designing and developing the tools, methods, and techniques to improve manufacturing efficiency and productivity. The working drawings will be aided by standards, company catalogues, and handbooks. The production tools design focuses on locating elements, clamping elements, tool guiding, and setting elements. Final project design is subjected to student's presentation and evaluation.

References

- Hoffman, Edward G., 2004, Jig and Fixture Design, 5th Edition, Delmar Publisher.
- Joshi, P.H., 2010, Jigs and Fixtures, 3rd Edition, McGraw-Hill.
- John G. N., 2003, Fundamentals of Tool Design. Society of Manufacturing Engineer, Michigan.

SURFACE ENGINEERING IN MANUFACTURING (BMIS 4123)

Course Learning Outcome

① Describe the necessary surface treatment of the substrate prior to coating process.
② Distinguish the available coating techniques and coating materials.
③ Match the various coating techniques and materials with a particular application.

Synopsis

This is an introductory course on the synthesis and application of surface treatment and coatings. The course covers the necessary surface preparation techniques prior to coating, the techniques to synthesis the coating, the various coating materials and the function of coating in various applications.

References

- Kalpakjian S. & Schmid S, 2006, Manufacturing Engineering and Technology, Singapore, Pearson.
- Mattox M. D., PVD Handbook.
- Schweitzer, Philip A., 2006, Paint and coatings: applications and corrosion resistance - CRC Press Taylor & Francis Group.

AEROSPACE MANUFACTURING AND MACHINING (BMIS 4723)

Course Learning Outcome

① Describe the principles and techniques of machining for Aerospace Components.
② Construct CAD/CAM program from Three to Five Axis machining for milling operations of Aerospace Components.
③ Create a complete CAD/ Program for any given actual industrial examples.

Synopsis

This course provides concepts and techniques to prepare students with advanced computer numerical control (CNC), computer aided design (CAD) and computer aided manufacturing (CAM) applications focusing on Aerospace Components. The course covers cutting planning and strategy as well as techniques in preparing the CAD / CAM program up to Five-Axis machining for metallic and composite aerospace components.

References

- Pradip K. Saha (2017), Aerospace Manufacturing Processes, CRC Press, Taylor & Francis Group.
- J. Srivinas (2016), CAD/CAM: Principles and Applications, Oxford University Press, India
- Michael Michaud (2012), CATIA Core Tools: Computer Aided Three-Dimensional Interactive Application, 1st Edition, McGraw-Hill Education.
- P N Rao (2010) CAD/CAM: Principles and Applications, 3rd Edition, Tata McGraw Hill Education Private Limited.

ERGONOMICS IN DESIGN
(BMIR 4513)

Course Learning Outcome

① Explain the concepts and functions of ergonomics in engineering design process.
② Apply the principles of ergonomics in the engineering design process.
③ Evaluate product or workstation design from ergonomics point of view.

Synopsis

This course looks into the application of ergonomics principles and knowledge in the engineering design process of workstations and products. The aims of this course to expose students on design principles when designing for human use. The content emphasizes optimizing potential interactions and interfaces between user and the system, at the front-end engineering design stage. Students will be involved in integrating, evaluating, and simulating the design and analysis of workstations and products through the lenses of ergonomist and human factors engineer.

References

- Tillman, B., Tillman, P., Rose, R. R., & Woodson, W. E. (2016). Human factors and ergonomics design handbook. McGraw-Hill Education.
- Eppinger, S. D., & Ulrich, K. T. (2011). Product design and development. McGraw-Hill.
  Kroemer, K. H., Kroemer, H. B., & Kroemer-Elbert, K. E. (2001). Ergonomics: how to design for ease and efficiency. Pearson College Division.
- Pheasant, S. (2014). Bodyspace: Anthropometry, Ergonomics & The Design of Work: Anthropometry, Ergonomics And The Design Of Work. CRC Press.

ELECTIVE 4 BMIG

MECHATRONICS (BMIA 4213)

Course Learning Outcome

① Solve mechatronics related problems which include actuators, sensors and controllers.
② Design and develop complex mechatronics system to be implemented as an industrial application.
③ Function effectively as an individual and in a group with the capacity to be a leader as well as an effective team member.
④ Communicate and present technical project confidently.

Synopsis

Mechatronics technologies are extensively used in developing manufacturing equipment. Mechatronics is defined as the synergistic combination of precision mechanical, electronic, and computer control in the design of products and manufacturing processes. This is a project-based subject. Students are expected to work in a mechatronics design project that includes integration, programming of microcontrollers and interfacing of mechatronics components such as fluid power system, sensors, electric actuators, mechanical drives and mechanisms. Students are expected to work in teams and have good communication skills.

References

- Bolton, W., 2013, Mechatronics: Electronic Control System in Mechanical and Electrical Engineering, 4th Edition, Prentice Hall.
- Carryer, O. K., 2011, Introduction to Mechatronic Design, Pearson.
- Dean, C. K., Margolis, D. L. and Rosenberg, R. C., 2012, System Dynamics: Modeling, Simulation, and Control of Mechatronic Systems, John Wiley & Sons.

NANOTECHNOLOGY (BMIB 4723)

Course Learning Outcome

① Explain the significant of nanotechnology.
② Analyze the properties of nanomaterials based on its structures.
③ Relate the understanding of nanomaterials properties with its synthesizing techniques and characterization methods.
④ Recommend suitable processing methods and potential application for particular type of nanocomposites.

Synopsis

This course introduces basic concepts of nanotechnology that cover introduction to nanotechnology, type and properties of nanomaterials as well as its synthesis and characterization techniques. It emphasizes the processing methods involved in nanomaterials exploitation technology such as sol-gel techniques, mechanical alloying, control solidifications, direct mixing, solution mixing, in situ polymerization and etc. besides, it covers the various applications of nanotechnology for industrials, energy, medicines, biotechnology as well as the safety and impact of nanotechnology to human and environment.

References

- Karkare, M., 2008, Nanotechnology: Fundamentals and Applications, I.K. International Pvt. Ltd.
- Cao, G. & Wang, Y., 2011, Nanostructures & Nanomaterials: Synthesis, Properties & Applications, 2nd Edition, New Jersey, N J: World Scientific.
- Mahmood, A., 2011, Nanocoating: Size Effects in Nanostructured Films, Springer-Verlag Berlin Heidelberg.

LEAN SIX SIGMA (BMIP 4323)

Course Learning Outcome

① Describe principle of Lean Manufacturing and Six Sigma.
② Apply appropriate tools and techniques of Lean Six Sigma for complex industrial problems.
③ Evaluate the source of production waste using Six Sigma approach.
④ Construct improvement strategy through the combination of Lean and Six Sigma concept.

Synopsis

Lean Management course provides fundamental thinking of the principle of eliminating production waste. Understanding the Lean Thinking is essential in order success in implementing the lean principles. In the meantime, Six Sigma approach emphasizes the importance of controlling variation in process. As a result, the Six Sigma approach able to control defects at only 3 pieces per million production quantity. Thus, combination of Lean tools & techniques and Six Sigma approach would be able to enhance productivity and quality.

References

- Watson-Hemphill, K., 2016, Innovating Lean Six Sigma: A strategic guide deploying the world's most effective business improvement process, McGraw Hill.
- Pyzdek, T., Keller, P., 2010, The Six Sigma Handbook, 3rd ed., .Mc Graw Hill.
- Ron, B., 2009, Implementing Six Sigma and Lean: A Practical Guide to Tools & Techniques, Butterworth-Heinemann.

CONCURRENT ENGINEERING (BMIR 4423)

Course Learning Outcome

① Apply various design tools to analyze products.
② Produce the alternative design that concerns with concurrent engineering technique and approach.
③ Demonstrate the design on concurrent engineering in a group design project.

Synopsis

This course introduces the principles and applications of Concurrent Engineering (CE). It covers the integration of CE tools and methods to enhance product development and support New Product Introduction (NPI) processes. Emphasis is placed on manufacturing competitiveness, process engineering, cooperative work practices, information modeling, and product development organization in an industrial context.
Students will develop skills in team dynamics and project management within concurrent engineering environments. The course also explores customer orientation, decision support systems, failure mode and effect analysis (FMEA), design for manufacturing and assembly (DFMA), rapid prototyping technologies, and related methodologies. Students are required to produce and analyse products based on concurrent engineering principles and critically evaluate engineering practices and industrial case studies.

References

- Walker D.J., 2000, Creative Techniques in Product and Engineering Design: A Practical Workbook.
- Biren P., 1997, Concurrent Engineering fundamental: integrated product development. Prentice-Hall Inc.
- Thomas A. S, 1995, What Every Engineer Should Know About Concurrent Engineering. Amazon.

ADVANCED CNC MACHINING (BMIS 4523)

Course Learning Outcome

① Recognize the capabilities of 2, 3, and 5 axis CNC machining.
② Develop complex programs for milling and turning operations.
③ Apply advanced CNC machining techniques to specific processes.
④ Use CAM software in producing complex products.

Synopsis

This course provides students with advanced concepts and practices in CNC machining that are advanced computer programming of CNC milling and turning with specific processes such as drilling, tapping, boring, grooving, facing and threading. Emphasis is on programming and production of complex parts including investigation in 3, 4 and 5- axis programming techniques, utilizing canned cycles, macros (subroutines), looping and parametric programming. The uses of CAM in producing complex and efficient programming techniques are also covered.

References

- Valentino, J. V. and Goldenberg J., 2010, Introduction to Computer Numerical Control CNC, 4th Edition, Pearson Prentice Hall.
- Karam, F., 2004, Using CATIA V5, Thomson (Delma Learning).
- Mattson, M, 2002, CNC Programming: Principles and Applications, Delmar Thompson Learning.

NON-METALLIC PROCESSES (BMIS 4113)

Course Learning Outcome

① Identify the non-metallic materials in terms of classification and properties.
② Explain the fundamental principles of non- metallic processing.
③ Explain the appropriate non-metallic processing to produce the end products.
④ Analyze the process parameters on the performance of products.

Synopsis

This course provides a basic knowledge of classification of non-metallic materials, such as polymers, ceramics and composites. Basically, non- metallic processes cover the topics of powder metallurgy, ceramic processing, polymers, plastics processing and composites manufacturing. This subject provides strong fundamental concepts and techniques particularly in fundamentals of processing such as injection molding, extrusion, pressing, etc.

References

- Kalpakjian, S. and Schimd, R. (2014) Manufacturing Engineering and Technology, 7th Edition, Prentice.
- Callister, W.D. Jr. (2010) Materials Science and Engineering - An Introduction, 8th Edition. John Wiley & Sons Inc.
- Degarmo, B.K., (2017), Materials and Processes in Manufacturing, 12th edition, Prentice Hall.

APPLIED MECHATRONICS (BMIA 4523)

Course Learning Outcome

① Solve mechatronics related problems which include actuators, sensors and controllers Design and develop complex mechatronics system to be implemented as an industrial application.
② Function effectively as an individual and in a group with the capacity to be a leader as well as an effective team member.
③ Communicate and present technical project confidently.

Synopsis

Mechatronics technologies are extensively used in developing manufacturing equipment. Mechatronics is defined as the synergistic combination of precision mechanical, electronic, and computer control in the design of products and manufacturing processes. This is a project- based subject. Students are expected to work in a mechatronics design project that includes integration, programming of microcontrollers and interfacing of mechatronics components such as fluid power system, sensors, electric actuators, mechanical drives and mechanisms. Students are expected to work in teams and have good communication skills.

References

- Bolton, W. (2018). Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 7th Edition, Pearson*
- Carryer, O. K., (2011). Introduction to Mechatronic Design, Pearson.
- Dean, C. K., Margolis, D. L. and Rosenberg, R. C., 2012. System Dynamics: Modeling, Simulation, and Control of Mechatronic Systems, John Wiley & Sons.
- Alciatore, G. D. and Histand, M. B. (2011). Introduction to Mechatronics and Measurement Systems, 4th Edition, McGraw Hill.
- McComb, G. (2013). Arduino Robot Bonanza, 1st Edition, McGraw Hill.
- Shetty, D. and Kolk, R. A. Mechatronics System Design (2011), 2nd Edition, Cengage Learning.

ELECTIVE 1 BMIF

INDUSTRIAL ACCOUNTING AND FINANCE (BMII 4513)

Synopsis

The course discussed on techniques and methods to analyze, interpret and use of financial information in planning and monitoring organizational operations. Among the topics covered are various costing methods, relevant costs for decision making, budgeting and budgetary control, accounting information for product pricing, and evaluation of company's performance. It also covers procedures and standards of financial reporting, analysis and evaluation of financial statements, internal control and computerised accounting system. Students will gain knowledge and skills in managing financial resources and apply techniques and methods in business decision ethically that will contribute to the organization's strategy. The course also discussed on techniques and methods to analyze, interpret and use of financial information in planning and monitoring organizational operations.

References

- Kimmel, P.D., Weygandt, J.J. and Kieso, D.E. (2014). Accounting Principles 11th Edition International Student Version. John Wiley.
- Peter Atrill and Eddie McLaney (2013). Accounting and Finance for Non-specialists. Pearson.
- Libby, R, Libby P., Philips, F., and Whitecotton, S. (2009). Principles of Accounting, McGraw Hill.
- Garrrison, R.H., Noreen, E.W., and Brewer, P.C. (2010). Managerial Accounting, 13th Edition. McGraw Hill.

INDUSTRIAL MARKETING (BMII 4523)

Synopsis

This subject will introduce the student to the marketing concepts and various strategic issues of marketing also their implication on business and organisational performance. Students will be taught the necessary skills and knowledge in preparing an effective marketing report on products and services to be marketed. Among the topics covered are marketing strategies, marketing analysis. This subject will provide students with practical guides on how to make decisions in strategic high-technology marketing that takes into account all disciplines. Topics include strategic analysis, strategic control and strategic marketing. Besides, students will be exposed to the various high-tech approaches of decision making such as pricing strategies, promotion etc. The subject also provides students with knowledge on global marketing, direct marketing, service marketing, etc. Students will also learn about the concepts and theories on high-tech application through problem-based learning activities, case study analysis and group project.

References

- Kotler, P., and Armstrong, G.M., (2014). Principles of Marketing. 15th Edition. New York, Pearson
- Brassington, F. and Petititt, S., (2010). Principles of Marketing. 4th Edition. New York, Pearson.
- Jobber, D., (2007). Principles and Practice of Marketing. New York, Pearson.

ECONOMICS FOR DECISION MAKING (BMII 4123)

Synopsis

The core components of this subject is the application of economic concepts in managing business transaction through optimising scarce resources. The subject discusses issues within the microeconomics and macroeconomics perspective. It provides understanding of how economists model various economic situations pertaining to end users and firms, market coordination and marketing functions effectively and efficiently. The focus is on the concepts of supply and demand, market concentration, quantitative demand and supply analysis, industrial environment, process and production flows and production function game theory in oligopolistic economy. The subject enriches students' knowledge on the impact of economy on businesses and increase understanding of government economic policies, national annual budget through the creation of productive human capital.

References

- Case, K.E., Fair, R.C. and Oster S.M. 2014. Principles of Economics (11th Edition). Pearson Education Limited, Harlow Essex England.
- Bade, Robin, Parkin, Michael. 2013. Foundations of Economics (6th Edition). Pearson Education South Asia Ltd, Singapore.
- Parkin, Michael. 2014. Economics (11th Edition). Pearson Education Limited. Harlow, Essex, England.

EMERGING POSITIVE ORGANIZATIONAL BEHAVIOR (BMII 4223)

Synopsis

This is a 3-credit hours course offered to fourth year students of Industrial Engineering program. This course consists of 3 lecture hours per week, reading assignments, in-class discussions, a team-based project and presentation. This subject emphasizes a study on individual and team behavior within the context of an organization. It provides contemporary topics, emerging theoretical and practical knowledge such as motivation, leadership, managerial decision-making group processes and conflict resolution. The major objective of this subject is to understand the organizational behavior concepts and models, moving from individual behavior to the team and organization. Areas of study include perception and learning, individual and personality motivation, values and job attitudes, stress, group dynamics, teamwork, decision making, conflict management inter-group relations, negotiation, communication leadership organization culture, organizational change and stress management.

References

- Stephen P. Robbins and Timothy A. Judge. Essential of Organizational Behavior, 14th Edition. Pearson, 2017.
- Robbins, S.P. and Judge, T.A. Organizational Behavior, 16th Ed. New Jersey, Prentice Hall 2019.
- Greenberg, J. and Baron, R.A. Behavior in Organization, 9th Ed: Upper Saddle River New Jersey: Prentice Hall, 2007.

ELECTIVE 2 BMIF

INFORMATION TECHNOLOGY SECURITY (BITS 3423)

Synopsis

Security in Information Technology is a very important issue. It is an area that deserves study by computer professionals, students, and even many computer users. Through this subject, student will be able to learn security services that covered Confidentiality, Integrity and Availability (CIA) in ICT based system. This subject also highlights use of cyberlaw in protecting user rights.
Finally, students will be able to learn methods in disaster recovery plan.

References

- Mohd Zaki Mas'ud, Mohd Faizal Abdollah, Zaheera Zainal Abidin, Siti Rahayu Selamat and Robiah Yusof (2011), Lab Manual Information Technology Security, Penerbit Universiti UTeM.
- Michael Goodrich, and Roberto Tamassia (2010), Introduction to Computer Security , Addison Wesley, ISBN 9780321512949.
- Mark Merkow and Jim Breithaupt (2006), Information Security: Principles and Practices, Pearson Prentice Hall, ISBN 0-13-154729-1.

INTELLIGENT SYSTEM (BMIA 4123)

Course Learning Outcomes

① Discuss the solutions to manufacturing issues based on various techniques. Discuss the solutions to manufacturing issues based on various techniques in computational intelligence.
② Explain the operational performance of different methods in artificial intelligence applied in manufacturing systems.
③ Devise an intelligent system for an application in a manufacturing system.

Synopsis

This course introduces the theory and concepts of artificial intelligence. It examines the structure of the current techniques of computational intelligence applied in a manufacturing system. The prospects of intelligent systems in manufacturing operations will be discussed.
The implementation of computational intelligence in actual practices will be carried out.

References

- Charu C. Aggarwal (2023). Neural Networks and Deep Learning, A Textbook. Editon 2, Springer
- Mohamed El Alaoui (2021), Fuzzy Topsis Logic, Approaches and Case Studies, Taylor Francis
- Michael Negnevitsky (2011). Artificial Intelligence: A Guide To Intelligent Systems, 3rd Edition, Pearson Education Canada : Addison Wesley.

HUMAN COMPUTER INTERACTION (BITM 2313)

Synopsis

This is a 3-credit hours course offered to fourth year students of Industrial Engineering program. This course provides an overview of a number of areas in human-computer interaction (HCI). HCI is an interdisciplinary area concerned with the design, evaluation, and implementation of interactive systems for human use and with the study of major phenomena surrounding them. HCI addresses any interaction with computers by humans, as developers or as users, as individuals or as groups. On completion of the course, students are expected to have theoretical knowledge of and practical experience in the fundamental aspects of designing, implementing, and evaluating interactive systems that are useful and usable. It is expected that students will become familiar with some of the literature in HCI and develop sufficient background in HCI issues to do more advanced work in this area. This course consists of 3 lecture hours per week, reading assignments, in-class discussions, a team-based project and presentation.

References

- Preece, J., Rogers, Y., & Sharp, H. (2019). Interaction design: Beyond human-computer interaction (5th ed.) John Wiley & Sons Ltd. ISBN 978-1-119-02075-2.
- Dix, A., Finlay, J., Abowd, G.D., & Beale, R. (2004). Human computer interaction (3rd ed.). Prentice Hall. ISBN 0-13-046109-1. You can find all of the resources related to this book online from the book's website at http://www.hcibook.com/e3/plain/about/book/. This is currently the major textbook used for teaching undergraduate HCI courses.
- Dov Te'eni, Jane Carey and Ping Zhang, Human Computer Interaction: Developing Effective Organizational Information Systems, John Wiley & Sons, 2007.

ELECTIVE 3 BMIF

GLOBAL OPERATION STRATEGY (BMII 4533)

Synopsis

In today's economic environment, the number one driving force behind focusing on manufacturing operations is to "reduce the total cost of manufacturing." Prior research has found that to accomplish this objective, many executives are attempting to synchronize manufacturing operations by deploying a common platform to manage maintenance, production, quality, and inventory. This course provides the students with the knowledge of macro level of policies which influence any nation in production of goods and services. This subject gives an overview of globalization and its impact in the scope of manufacturing. Topics discuss among others are: political and economical organization, trade institutions, globalization of world economy, trade barriers, enterprise type and global strategies. In sort, students will learn about globalization and its influence to manufacturing management. Furthermore, in micro level policies this subject also enriched with company level policies/ management to improve company's competitiveness. This covers: knowledge management, enterprise planning, supply chain, location decision, logistics control and procurement. Students shall be enabled to form a systematic manufacturing management and project execution considering relevant decision criteria in the framework of global conditions. Complexity is managed by analysis and design being related to reference models.

References

- Gong, Y., 2013, Global Operations Strategy: Fundamentals and Practice in Business and Economics, Springer.
- Yeming G., 2013, Basic concepts of global operations strategy, DOI 10.1007/978-3-642-36708-3_1
- C.M.Chang, 2016, Engineering Management: Meeting the global challenges, 2nd Edition, CRC Press.

STRATEGIC INNOVATION MANAGEMENT (BTMP 2243)

Synopsis

This subject discusses strategic imperatives in research implementation and innovation management. Topics include developing research and innovation processes, as well as technology and innovation strategic management. Students will acquire the necessary knowledge and skills in innovation processes and management. The subject also discusses intellectual property rights. Case studies will be incorporated to enhance students' understanding on strategic innovation management.

References

- Schilling, M. A., (2013), Strategic Management of Technological Innovation, 4th Edition, New York: McGraw Hill International Edition. (Main Reference).
- Tidd, J., & Bessant, J. (2014). Strategic innovation management. John Wiley & Sons.
- Dodgson, M., Gann, D. M., & Salter, A. (2008).

OPTIMIZATION MODELS FOR DECISION MAKING (BMII 4543)

Synopsis

Resources in organization such as machinery, money, energy, labour force are elements to make products or provide services. These resources are limited, and managers need to make decisions on how to manage these resources in an optimal way. Thus, optimization in industrial operation is a common problem in industries as organizations seek to use their resources effectively. This course will introduce optimization models and methods for solving common optimization problems in industrial engineering applications. This course will cover two main topics of optimization models. The first phase of the course will focus of networks problems while the second phase will concentrate on the fundamental and methods in integer programming models. Student will be exposed to a variety of typical applications of these optimization models in industrial planning problems.

References

- Carter, Michael W., and Camille C. Price. Operations research: a practical introduction. Crc Press, 2nd Edition, 2017
- Hamdy, A.Taha., Operation Research : An Introduction, 10th Edition, 2017.
- Hillier, F. & Lieberman, G. J., Introduction to Operation Research. 10th ed. McGraw-Hill, 2014

SPECIAL TOPICS IN INDUSTRIAL ENGINEERING (BMII 4443)

Course Learning Outcome

1. Explain the concepts or terminology of special topics in Industrial Engineering
2. Solve problem related to special topics in Industrial Engineering
3. Present or write report related to special topics in Industrial Engineering

Synopsis

This elective course, exclusively for outbound mobility students, is relevant to any Industrial Engineering disciplines, including but not limited to plan layout, materials handling, work and time study, human factors and ergonomics, supply chain management, automation and social systems.

References

According to special topics taught in the host university.

ELECTIVE 4 BMIF

PRODUCTION TOOL DESIGN (BMIR 4223)

Course Learning Outcome

① Explain the basic principles of production tools design in manufacturing field.
② Apply the basic principles of production tool design with current industrial practice.
③ Design the efficient production tools for manufacturing, assembly and inspection processes.

Synopsis

This course introduces the basic principles and methods in designing of production tools which Consists of jigs, fixtures, mould and dies, for materials removal processes and inspection Process. The student will be exposed to the application of engineering graphics in design and Develop drawing of production tools. The production drawing will be aided by industrial Standards, company catalogues and handbooks.

References

- Alting, Leo. Manufacturing Engineering Processes. Crc Press, 2020.
- Heaney, Donald F., Handbook of Metal Injection Molding. Woodhead Publishing, 2018
- Boljanovic, Vukota, Sheetmetal Stamping Dies: Die Design and Die-making Practice, New York, Ny: Industrial Press, 2013
- E. J. H. Jones , H. C. Town, Production Engineering: Jig and Tool Design 8th Edition, Kindle Edition, Newnes, 2013
- Boljanovic, Vukota, Metal Shaping Processes: Casting and Molding, Particulate Processing, deformation Processes, And Metal Removal, New York, Ny: Industrial Press, 2010.

METAL PROCESSING TECHNOLOGIES (BMIS 4513)

Course Learning Outcome

① Utilize the knowledge and understanding of strength aspects on various metallic materials and impact of additive material.
② Conduct the work procedures for the design of welding, casting and sheet metal products.
③ Determine constructive design; static and dynamic design of welding, casting and sheet metal products.
④ Recognize the optimization techniques for welding, casting and sheet metal products.

Synopsis

This course is an extension to manufacturing process. Three major manufacturing processes namely welding, casting and sheet metal are covered in details. Topics include strength of various metallic construction materials; work procedures for the design of welding, casting and sheet metal products; constructive design; static and dynamic design of welding, casting and sheet metal products; impact of additive material; optimization selection of materials, additive, parameters etc. Also included are optimization of quality and costs ability to formulate new standards, rules and procedure specifications for welding, casting and sheet metal products.

References

- Rao, P. N., 2023, Manufacturing Technology Foundry, Forming and Welding, 2nd Edition, McGraw Hill
- Shan, H. S., 2022, Manufacturing Processes: Casting, Forming and Welding, 2nd Edition, Cambridge University Press, India
- Jeffus, L., 2021, Welding: Principles and Applications, 9th Edition, Cengage Learning, Boston, MA: Cengage Learning.
- Campbell, J., 2019, Complete Casting Handbook Metal Casting Processes, Metallurgy, Techniques and Design, Elsevier Science, Oxford, United Kingdom
- Remus, T., 2021, Advanced Sheet Metal Fabrication, Wolfgang Publications, Minnesota, USA.

INDUSTRIAL ROBOTICS (BMIA 4113)

Course Learning Outcome

① Explain the components of robots, their structures and applications in manufacturing industry.
② Explain the role of forward and inverse kinematics in robot arms.
③ Analyze the planned trajectory of a robot arm in a production cell.
④ Devise the motion controls of a robot arm in a production cell.

Synopsis

The course aims at delivering a basic knowledge of robotics with an emphasis on the understanding of robotic concepts. The topics include the components of robots, their structure, applications in manufacturing system, and the role of forward and inverse kinematics in robot arms. The planned trajectory of a robotic system and the motion control of a robot arm in a production cell will be investigated as well.

References

- Niku, S. B., 2010, Introduction to Robotics Analysis Systems Applications, Prentice Hall.
- Rehg, J. A., 2003, Introduction to Robotics in CIM Systems, 5th Edition, Prentice Hall.
- Craig, J.J., 2013, Introduction to Robotics: Mechanics and Control, Pearson Prentice Hall.

ADDITIVE MANUFACTURING (BMIR 4613)

Course Learning Outcome

① Explain the basic principles of various additive manufacturing (AM) technologies and their influence on product development.
② Illustrate the capabilities, limitations, and areas of application of various AM technologies.
③ Develop a part or product with the appropriate AM technology.

Synopsis

Additive manufacturing (AM), also known as 3D printing, is transforming how products are designed, produced, and serviced. Additive manufacturing is a process in which a three-dimensional computer model design is built into a physical object by joining thin layers of material. AM is a versatile field that encompasses a variety of methods, materials, and applications. AM lets us produce parts on-demand, without dedicated equipment or tooling. That unparalleled flexibility unlocks digital design tools that can create complex parts with breakthrough performance. Many companies are starting to recognize the benefits additive manufacturing (AM) offers in terms of speed, simplicity, reliability, and cost. But knowledge of the fundamental principles of AM, its applications, and its implications is one of the main barriers to its rapid adoption. The course will introduce the concepts of various AM techniques. It will emphasis the strengths and weaknesses of the various technologies and will highlight applications and case studies from the AM industry.

References

- Additive manufacturing technologies, Ian Gibson, David W Rosen, Brent Stucker, Mahyar Khorasani, Springer, 2021
- 3D Printing and Additive Manufacturing Technologies, Kumar, L. Jyothish, Pandey, P. M., Wimpenny, David Ian, 2019 Springer
- 3D Printing for Dummies, 2017, 2nd Edition, John Wiley & Sons.
- The 3D printing handbook, Technologies, design and application, Ben Redwood, Brian Garret, Filemon Schoffer, 3D Hubs, 2017
- From Additive Manufacturing to 3D/4D Printing, Jean Claude Andre, 2018, John Wiley & Sons.
- Additive Manufacturing Handbook, Product Development for the Defense Industry, Adedeji B. Badiru, Vhance V. Valencia, David Liu, 2017, Taylor & Francis Group.
- Additive Manufacturing of Metals, From Fundamental Technology to Rocket Nozzles, Medical Implants, and Custom Jewelry, John O. Milewski, 2017, Springer.

CURRICULUM STRUCTURE OF
ENGINEERING TECHNOLOGY PROGRAMME

BMID

PROGRAM DETAILS

BACHELOR OF MANUFACTURING ENGINEERING TECHNOLOGY (PRODUCT DESIGN) WITH HONOURS

BMID is designed to produce competent engineering technologists with expertise in product design and manufacturing technologies. The programme emphasizes creativity, technical skills, digital design tools, prototyping, and sustainable product development, supported by industry-based learning experiences to prepare graduates for technology-driven manufacturing environments. Graduates of BMID are prepared to pursue careers as Product Designers, Industrial Designers, CAD Specialists, Manufacturing Engineers, Product Development Engineers, Design Engineers, Project Managers, and other related roles across manufacturing, automotive, consumer products, aerospace, and technology-driven industries. The programme aims to produce future-ready technologists capable of leading product innovation and contributing to the advancement of the manufacturing sector at both national and international levels.

BMID

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:

PEO 1	Graduates who are able to practice the knowledge in Manufacturing Engineering Technology (**Product Design**).
PEO 2	Graduates who are able to engage with continuous development and adapt to evolving technologies.
PEO 3	Graduates who are able to adapt professional ethics and leadership to meet the needs of the society.

BMID

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	Apply knowledge of mathematics, natural sciences, computing, and engineering fundamentals to define and apply engineering procedures, processes, systems, or methodologies in the field of Manufacturing Engineering Technology (**Product Design**).
PO2	Identify, formulate, research literature, and analyse broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to the field of Manufacturing Engineering Technology **(Product Design),** with considerations for sustainable development.
PO3	Design solutions for broadly-defined engineering technology problems and contribute to the design of systems, components, or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon, and resource, cultural, societal, and environmental considerations.
PO4	Conduct investigations of broadly-defined engineering problems; locate, search, and select relevant data from codes, databases, and literature; design and conduct experiments to provide valid conclusions.
PO5	Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems, with an understanding of their limitations.
PO6	Analyse and evaluate the sustainable development impacts of engineering technology solutions on society, the economy, sustainability, health and safety, legal frameworks, and the environment in solving broadly-defined engineering problems.
PO7	Understand and commit to professional ethics and norms of engineering technology practice, adhere to relevant national and international laws, and demonstrate understanding of the need for diversity and inclusion.
PO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams, in multidisciplinary, face-to-face, remote, and distributed settings.
PO9	Communicate effectively and inclusively on broadly-defined engineering activities with the engineering community and society at large, including the ability to comprehend and write effective reports, design documentation, and deliver presentations, taking into account cultural, language, and learning differences.
PO10	Apply knowledge and understanding of engineering management principles, economic decision-making, and entrepreneurial practices to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments and engage in self-improvement initiatives for career, professional, or educational goals.
PO11	Recognise the need for, and have the ability to engage in, independent and lifelong learning, including critical thinking, to face new and emerging technologies.

BMID

Curriculum Details & Structure 2026/2027

	YEAR 1		YEAR 2		YEAR 3		YEAR 4		Credits
	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2	
University Compulsory Courses	BKK* ***1 Co-Curriculum I	BKK* ***1 Co-Curriculum 2	BLLW 2152 Academic Writing	**BLHW 2792 Integrity and Anti-Corruption	BLLW 3162 English for Professional Interaction	BLHC 4032 Critical and Creative Thinking			18
		BLLW 1142 English for Academic Purposes	BLHW 2722 Malaysian Nation State Aspiration/ *BLHW 2762 Malaysian Citra		BTMW 4012 Technology Entrepreneurship				
			BLHW 1772 Philosophy and Current Challenges/ *BLHW 1762 Philosophy and Current Issues						
University Elective Courses				BLLW ***2 Third Language					2
Programme Core Course	BELG 1013 Technical Mathematics	BMIG 1023 Calculus for Technology	BMKG 2033 Applied Calculus for Technology	BERG 2043 Statistical Methods	BMIU 3804 Integrated Design Project		BMIU 4053 Engineering Ethics and OSHE		19
Faculty Core	BMID 1303 Engineering Drawing and CAD	BMID 2504 Advanced Engineering Graphic & CAD	BMIP 2333 Quality Control	BMID 3583 CAE	BMID 3533 Design for Manufacture & Assembly	BMIU 3764 Bachelor Degree Project I	BMIU 4774 Bachelor Degree Project I (Pre Requisite BMIU 3764)	BMIU 47812 Industrial Training	96
	BMID 1313 Statics	BMID 2333 Dynamics and Mechanics of Machine	BMID 2323 Solid Mechanics	BMID 2313 Thermofluids	BMID 3523 CNC Technology	BMID 3563 Production Tool Design	BMID 4013 Sustainable Development		
	BMIP 1313 Engineering Materials	BMID 2324 Product Design and Development	BMID 3543 Rapid Manufacturing	BELR 1343/ BMIW 1343 Computer Programming	BMIP 2343 Control System	BMID 3573 Design of Machine Element	BMIP 3354 Industrial Engineering		
	BMIP 1323 Manufacturing Processes	BMIP 2503 Measurement and Instrumentation		BMID 3553 Ergonomics Design		BMID 2514 Computer Aided Manufacturing			
	BMIW 1313 Principle of Electric and Electronic								
Electives Courses						BMI* 38*4 Elective 1	BMI* 48*4 Elective 2		8
Credits	19	20	18	19	17	20	18	12	143

** For International Student Only*

*** Referring to Non-Credit Course Exemption (if student attained Credit Transfer for Integrity and Anti-Corruption, then students will be required to replace the credit with Critical and Creative Thinking)*

SYLLABUS (BMID)

University Compulsory Courses

- Co-Curriculum I
- Co-Curriculum II
- English for Academic Purposes
- Academic Writing
- English for Professional Interaction
- Technology Entrepreneurship
- Nation State Aspiration/ *Malaysian Citra
- Philosophy and Current Challenges/ *Philosophy and Current Issues
- Critical and Creative Thinking
- Integrity and Anti-Corruption

University Elective Courses

- Third Language

Program Core Courses

- Technical Mathematics
- Calculus for Technology
- Applied Calculus for Technology
- Statistical Methods
- Integrated Design Project
- Engineering Ethics and OSHE
- Professional Certificate Preparation Course

BMID-Core Courses

- Engineering Drawing and CAD
- Advanced Engineering Graphics & CAD
- Statics
- Dynamics and Mechanics of Machine
- Principle of Electric & Electronics
- Engineering Material
- Solid Mechanics
- Computer Programming
- Control System
- Manufacturing Processes
- Thermofluids
- Quality Control
- Industrial Engineering
- Product Design and Development
- CNC Technology
- Computer Aided Manufacturing
- Design for Manufacturing and Assembly
- Rapid Manufacturing
- Production Tool Design
- Design of Machine Element
- CAE
- Sustainable Development
- Bachelor Degree Project 1
- Bachelor Degree Project 2
- Industrial Training

**International students*

BMID Elective Courses

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Elective 1

- BMID 3804
  Industrial Design
- BMIP 3814
  Manufacturing System
- BMID 4824
  Automotive Component Manufacturing
- BMIP 4834
  IoT Manufacturing

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Elective 2

- BMID 4814
  Mould Design
- BMID 4834
  Packaging Design and Technology
- BMIP 3583
  Advanced Machining

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Language Electives Courses

- BLLW 1212
  Arabic Language
- BLLW 1222
  Mandarin Language
- BLLW 1232
  Japanese Language
- BLLW 1172
  Bahasa Melayu Komunikasi 1*
- BLLW 1242
  Korean Language 1
- BLLW 1252
  German 1

*For international students only

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Professional Certificate Preparation Courses

- BMID 3100
  Certified SolidWorks Associate
- BMMA 3110
  Certified Hypermesh

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BMIP

PROGRAM DETAILS

BACHELOR OF MANUFACTURING ENGINEERING TECHNOLOGY (PROCESS AND TECHNOLOGY) WITH HONOURS

BMIP is designed to produce competent engineering technologists with expertise in manufacturing processes and technologies. The programme emphasizes technical knowledge, manufacturing systems, CAD/CAM, materials engineering, instrumentation, quality control, and advanced manufacturing processes, supported by industry-based learning experiences to prepare graduates for technology-driven manufacturing environments. Graduates of BMIP are prepared to pursue careers as Process Engineers, Manufacturing Engineers, Production Engineers, Quality Engineers, Materials Engineers, Operations Engineers, and other related roles across manufacturing, automotive, aerospace, and technology-driven industries. The programme aims to produce future-ready technologists capable of leading process improvements, technological innovation, and sustainable manufacturing practices that contribute to the advancement of the manufacturing sector at both national and international levels.

BMIP

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:

PEO 1	Graduates who are able to practice the knowledge in Manufacturing Engineering Technology (**Process and Technology**).
PEO 2	Graduates who are able to engage with continuous development and adapt to evolving technologies.
PEO 3	Graduates who are able to adapt professional ethics and leadership to meet the needs of the society.

BMIP

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	Apply knowledge of mathematics, natural sciences, computing, and engineering fundamentals to define and apply engineering procedures, processes, systems, or methodologies in the field of Manufacturing Engineering Technology (**Process and Technology**).
PO2	Identify, formulate, research literature, and analyse broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to the field of Manufacturing Engineering Technology **(Process and Technology),** with considerations for sustainable development.
PO3	Design solutions for broadly-defined engineering technology problems and contribute to the design of systems, components, or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon, and resource, cultural, societal, and environmental considerations.
PO4	Conduct investigations of broadly-defined engineering problems; locate, search, and select relevant data from codes, databases, and literature; design and conduct experiments to provide valid conclusions.
PO5	Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems, with an understanding of their limitations.
PO6	Analyse and evaluate the sustainable development impacts of engineering technology solutions on society, the economy, sustainability, health and safety, legal frameworks, and the environment in solving broadly-defined engineering problems.
PO7	Understand and commit to professional ethics and norms of engineering technology practice, adhere to relevant national and international laws, and demonstrate understanding of the need for diversity and inclusion.
PO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams, in multidisciplinary, face-to-face, remote, and distributed settings.
PO9	Communicate effectively and inclusively on broadly-defined engineering activities with the engineering community and society at large, including the ability to comprehend and write effective reports, design documentation, and deliver presentations, taking into account cultural, language, and learning differences.
PO10	Apply knowledge and understanding of engineering management principles, economic decision-making, and entrepreneurial practices to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments and engage in self-improvement initiatives for career, professional, or educational goals.
PO11	Recognise the need for, and have the ability to engage in, independent and lifelong learning, including critical thinking, to face new and emerging technologies.

BMIP

Curriculum Details & Structure 2026/2027

	YEAR 1		YEAR 2		YEAR 3		YEAR 4		Credits
	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2	
University Compulsory Courses	BKK* ***1 Co-Curriculum I	BKK* ***1 Co-Curriculum 2	BLLW 2152 Academic Writing	BLHW 1772 Philosophy and Current Challenges/ *BLHW 1762 Philosophy and Current Issues	BLLW 3162 English For Professional Interaction	**BLHW 2792 Integrity and Anti- Corruption			18
		BLLW 1142 English for Academic Purposes	BLHW 2722 Malaysian Nation State Aspiration/ *BLHW 2762 Malaysian Citra		BTMW 4012 Technology Entrepreneurship				
			BLHC 4032 Critical and Creative Thinking						
University Elective Courses				BLLW ***2 Third Language					2
Programme Core Course	BELG 1013 Technical Mathematics	BMIG 1023 Calculus for Technology	BMKG 2033 Advanced Calculus for Technology	BERG 2043 Statistical Methods	BMIU 3804 Integrated Design Project		BMIU 4053 Engineering Ethics and OSHE		19
Faculty Core	BMID 1303 Engineering Drawing and CAD	BELR 1343/ BMIW 1343 Computer Programming	BMIP 2333 Quality Control	BMIP 2343 Control System	BMIP 3354 Industrial Engineering	BMIU 3764 Bachelor Degree Project 1	BMIU 4774 Bachelor Degree Project 2	BMIU 47812 Industrial Training	96
	BMID 1313 Statics	BMID 2333 Dynamics and Mechanics of Machine	BMID 2323 Solid Mechanics	BMID 2313 Thermofluid	BMIP 3533 Advanced Manufacturing Processes	BMIP 3563 Jigs & Fixtures	BMID 4013 Sustainable Development		
	BMIP 1313 Engineering Materials	BMIP 2543 Material Selection	BMIP 3523 Joining Technology	BMIP 3573 Materials Testing and Fracture Analysis	BMID 3523 CNC Technology	BMIP 2514 CAD / CAM	BMIP 3584 Advanced Machining		
	BMIP 1323 Manufacturing Processes	BMIP 2503 Measurement and Instrumentation		BMID 2324 Product Design and Development		BMID 3593 Plastic Technology			
	BMIW 1313 Principle of Electric and Electronic								
Electives Courses						BMI* 38*4 Elective 1	BMID 48*4 Elective 2		8
Credits	19	18	18	20	18	20	18	12	143

** For International Student Only*

*** Referring to Non-Credit Course Exemption (if student attained Credit Transfer for Integrity and Anti- Corruption, then students will be required to replace the credit with Critical and Creative Thinking)*

SYLLABUS (BMIP)

University Compulsory Courses

- Co-Curriculum I
- Co-Curriculum II
- English for Academic Purposes
- Academic Writing
- Critical and Creative Thinking
- Nation State Aspiration/ *Malaysian Citra
- Philosophy and Current Challenges/ *Philosophy and Current Issues
- English for Professional Interaction
- Technology Entrepreneurship
- Integrity and Anti-Corruption

University Elective Courses

- Third Language

Program Core Courses

- Technical Mathematics
- Calculus for Technology
- Applied Calculus for Technology
- Statistics Methods
- Integrated Design Project
- Engineering Ethics and OSHE

BMIP-Core Courses

- Engineering Drawing and CAD
- Statics
- Engineering Material
- Manufacturing Processes
- Principle of Electric & Electronics
- Computer Programming
- Dynamics and Mechanics of Machine
- Material Selection
- Measurement and Instrumentation
- Quality Control
- Solid Mechanics
- Joining Technology
- Control System
- Thermofluids
- Materials Testing and Fracture Analysis
- Product Design and Development
- Industrial Engineering
- Advanced Manufacturing Process
- Technology CNC
- Jig & Fixtures
- CAD/CAM
- Plastic Technology
- Sustainable Development
- Advanced Machining
- Bachelor Degree Project 1
- Bachelor Degree Project 2
- Industrial Training

**International students*

BMIP Elective Courses

Elective 1	Elective 2	Language Electives Courses
• BMIP 3804 Lean Manufacturing • BMIP 3814 Manufacturing System	• BMID 4814 Mould Design • BMID 4824 Automotive Component Manufacturing • BMIP 4834 IoT in Manufacturing	• BLLW 1212 Arabic Language • BLLW 1222 Mandarin Language • BLLW 1232 Japanese Language • BLLW 1172 Bahasa Melayu Komunikasi 1* • BLLW 1242 Korean Language 1 • BLLW 1252 German 1 *For international students only
Professional Certificate Preparation Courses		
• BMMA 3100 Certified CATIA V6 – Part Design Associate • BMCG 2520 AutoCAD Professional Certification		

BMIW

PROGRAM DETAILS

BACHELOR OF MANUFACTURING ENGINEERING TECHNOLOGY WITH HONOURS

BMIW is designed to produce competent engineering technologists with expertise in manufacturing engineering technology and smart manufacturing systems. The programme emphasizes technical knowledge, manufacturing processes, automation, Industrial Internet of Things (IIoT), quality improvement, production optimization, and digital manufacturing, supported by industry-based learning experiences to prepare graduates for Industry 4.0 environments. Graduates of BMIW are prepared to pursue careers as Manufacturing Engineers, Industrial Engineers, Automation Specialists, Process Engineers, Quality Engineers, Smart Manufacturing Engineers, and other related roles across manufacturing, automotive, aerospace, electronics, and technology-driven industries. The programme aims to produce future-ready technologists capable of leading digital transformation, technological innovation, and sustainable manufacturing practices that contribute to the advancement of the manufacturing sector at both national and international levels.

BMIW

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:

PEO 1	Graduates who are able to practice the knowledge in Manufacturing Engineering Technology.
PEO 2	Graduates who are able to engage with continuous development and adapt to evolving technology.
PEO 3	Graduates who are able to adapt professional ethics and leadership to meet the needs of the society.

BMIW

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	Apply knowledge of mathematics, natural sciences, computing, and engineering fundamentals to define and apply engineering procedures, processes, systems, or methodologies in the field of Manufacturing Engineering Technology.
PO2	Identify, formulate, research literature, and analyse broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to the field of Manufacturing Engineering Technology, with considerations for sustainable development.
PO3	Design solutions for broadly-defined engineering technology problems and contribute to the design of systems, components, or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon, and resource, cultural, societal, and environmental considerations.
PO4	Conduct investigations of broadly-defined engineering problems; locate, search, and select relevant data from codes, databases, and literature; design and conduct experiments to provide valid conclusions.
PO5	Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems, with an understanding of their limitations.
PO6	Analyse and evaluate the sustainable development impacts of engineering technology solutions on society, the economy, sustainability, health and safety, legal frameworks, and the environment in solving broadly-defined engineering problems.
PO7	Understand and commit to professional ethics and norms of engineering technology practice, adhere to relevant national and international laws, and demonstrate understanding of the need for diversity and inclusion.
PO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams, in multidisciplinary, face-to-face, remote, and distributed settings.
PO9	Communicate effectively and inclusively on broadly-defined engineering activities with the engineering community and society at large, including the ability to comprehend and write effective reports, design documentation, and deliver presentations, taking into account cultural, language, and learning differences.
PO10	Apply knowledge and understanding of engineering management principles, economic decision-making, and entrepreneurial practices to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments and engage in self-improvement initiatives for career, professional, or educational goals.
PO11	Recognise the need for, and have the ability to engage in, independent and lifelong learning, including critical thinking, to face new and emerging technologies.

BMIW

Curriculum Details & Structure 2026/2027

	YEAR 1		YEAR 2		YEAR 3		YEAR 4		Credits
	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2	
University Compulsory Courses	BKK* ***1 Co-Curriculum I	BKK* ***1 Co-Curriculum 2	BLLW 2152 Academic Writing	**BLHW 2792 Integrity and Anti-Corruption					18
		BLLW 1142 English for Academic Purposes	BLHC 4032 Critical and Creative Thinking		BTMW 4012 Technology Entrepreneurship	BLLW 3162 English For Professional Interaction			
		BLHW 1772 Philosophy and Current Challenges/ *BLHW 1762 Philosophy and Current Issues	BLHW 2722 Malaysian Nation State Aspiration/ *BLHW 2762 Malaysian Citra						
University Elective Courses				BLLW ***2 Third Language					2
Programme Core Course	BELG 1013 Technical Mathematics	BMIG 1023 Calculus for Technology	BERG 2043 Statistical Methods	BMKT 2033 Applied Calculus for Technology	BM** ***0 Professional Certificate Preparation Course		BMIU 4053 Engineering Ethics and OSHE		15
Faculty Core	BMID 1313 Statics	BMID 2333 Dynamics and Mechanics of Machine	BMID 2323 Solid Mechanics	BMIW 2333 Additive Manufacturing	BMIU 3804 Integrated Design Project	BMIW 3383 Industrial Internet of Things	BMIW 4113 Engineering Financial and Project Management	BMIU 47812 Industrial Training	96
	BELR 1343/ BMIW 1343 Computer Programming	BMIP 1313 Engineering Materials	BMIP 2343 Control System	BMIW 2343 Product Design and Manufacturing	BMIW 3113 Applied Industrial Engineering	BMIW 3223 Visual Design & Manufacturing	BMIU 4774 Bachelor Degree Project 2		
	BMID 1303 Engineering Drawings And CAD	BMID 2313 Thermofluids	BMIP 2503 Measurement & Instrumentation	BMIP 2333 Quality Control	BMIW 2323 Data Management and Process Optimization	BMIP 3533 Advanced Manufacturing Processes	BMID 4013 Sustainable Development		
	BMIW 1313 Principle of Electric and Electronics	BMIW 1213 Solid Modelling		BMIW 1303 CAD / CAM & CNC Tech.	BMIW 3133 Supply Chain Management	BMIU 3764 Bachelor Degree Project 1			
	BMIP 1323 Manufacturing Processes								
Electives Courses					BMIW ***3 Elective 1	BMIW ***3 Elective 2	BMIW ***3 Elective 3		12
							BMIW ***3 Elective 4		
Credits	19	20	18	19	18	18	19	12	143

** For International Student Only*

*** Referring to Non-Credit Course Exemption (if student attained Credit Transfer for Integrity and Anti-Corruption, then students will be required to replace the credit with Critical and Creative Thinking)*

SYLLABUS (BMIW)

University Compulsory Courses

- Co-Curriculum I
- Co-Curriculum II
- English for Academic Purposes
- Academic Writing
- English for Professional Interaction
- Technology Entrepreneurship
- Nation State Aspiration/ *Malaysian Citra
- Philosophy and Current Challenges/ *Philosophy and Current Issues
- Critical and Creative Thinking
- Integrity and Anti-Corruption

University Elective Courses

- Third Language

Program Core Courses

- Technical Mathematics
- Calculus for Technology
- Applied Calculus for Technology
- Statistics Methods
- Engineering Ethics and OSHE
- Professional Certificate Preparation Course

BMIW-Core Courses

- Statics
- Computer Programming
- Engineering Drawing and CAD
- Principle of Electric & Electronics
- Manufacturing Processes
- CAD / CAM & CNC Technology
- Dynamics and Mechanics of Machine
- Engineering Materials
- Thermofluids
- Solid Modelling
- Solid Mechanics
- Control System
- Measurement and Instrumentation
- Additive Manufacturing
- Product Design and Manufacturing
- Quality Control
- CAD/CAM and CNC Technology
- Integrated Design Project
- Applied Industrial Engineering
- Data Management and Process Optimization
- Supply Chain Management
- Industrial Internet of Things
- Visual Design & Manufacturing
- Advanced Manufacturing Process
- Engineering Financial and Project Management
- Sustainable Development
- Bachelor Degree Project 1
- Bachelor Degree Project 2
- Industrial Training

**International students*

BMIW Electives Courses

Elective 1	Elective 2	Elective 3 & 4
• BMIW 3803 Aircraft Structural Components • BMIW 3813 Aerospace Jigs and Fixtures • BMIW 3823 Industrial Design • BMIW 3833 Visual Communication • BMIW 4123 Cloud Manufacturing • BMIW 2313 Industrial Robotic & Automation	• BMIW 3863 Composite Components for Aerospace • BMIW 3873 Aerospace Measurement and Inspection • BMIW 3883 Product Architecture and Usability Testing • BMIW 3893 Consumer Product Design and Development • BMIW 3903 Cyber Security in Digital Manufacturing • BMIW 3913 Artificial Intelligence	• BMIW 4923 Metallic Components for Aerospace • BMIW 4933 Aerospace Component Machining • BMIW 4953 Vehicle Design and Development • BMIW 4943 Packaging Design and Technology • BMIW 3843 Data Structure and Algorithm • BMIW 4963 IT Communication in Digital Manufacturing • BMIW 4973 Advanced Manufacturing Enterprise • BMIW 3853 Digital Factory & Simulation
Language Electives Courses	**Professional Certificate Preparation Courses**	
• BLLW 1212 Arabic Language • BLLW 1222 Mandarin Language • BLLW 1232 Japanese Language • BLLW 1172 Bahasa Melayu Komunikasi 1* • BLLW 1242 Korean Language 1 • BLLW 1252 German 1 *For international students only	• BMMA 3100 Certified CATIA V6 – Part Design Associate • BMMA 3110 Certified Hypermesh	

TECHNICAL MATHEMATICS/ MATEMATIK TEKNIKAL (BELG 1013)

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

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

CALCULUS FOR TECHNOLOGY/KALKULUS UNTUK TEKNOLOGI (BMIG 1023)

LEARNING OUTCOMES

Upon completion of this course, students 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 appropriatetechniques.

SYNOPSIS

This course introduces the differential and integral calculusof 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 itsapplications cover the area of a bounded region or area between curves as well as the volume of a solid of a revolution.

REFERENCES

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

ADVANCED CALCULUS FOR TECHNOLOGY/ KALKULUS LANJUTAN UNTUK TEKNOLOGI (BMKG 2033)

LEARNING OUTCOMES

Upon completion of this course, students 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 cover the homogeneous and the non-homogeneous equations using the undetermined coefficients methods and variation parameters.

REFERENCES

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

STATISTICAL METHODS/KAEDAH STATISTIK (BERG 2043)

LEARNING OUTCOMES

Upon completion of this course, students 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 applications in Microsoft Excel to solve real application questions.

REFERENCES

- Hasim, N.A.H., Hussin, N.H., Ahmad, A. & Miswan,
- N.H. (2019). Statistical Methods for Technology, (Workbook) for Engineering Technology Degree Programs. Penerbit UTeM.
- Paolella, M.S. (2018), Fundamental Statistical Inference: A
- Computational Approach. John Wiley & Sons, Incorporated. ISBN: 9781119417880 (eBook).
- Steyer, R. & Nagel, W. (2017), Probability and Conditional
- Expectation: Fundamentals for the Empirical Sciences, John Wiley & Sons, Incorporated. ISBN: 9781119243502 (eBook).
- 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)
- Rohatgi, V.K. & Saleh, A.K.E. (2015). An Introduction to Probability and Statistics (3rd ed.). John Wiley & Sons, Incorporated. ISBN: 9781118799659 (eBook)

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

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 societyand the environment.

SYNOPSIS

This course will discuss the concepts 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 people, 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 onthe OSHA, critical safety and health hazards, first aids procedures and practice, its organization and how the OSHA manage to monitor safety and health effectively, case study on the occupational safety and health.

REFERENCES

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

INTEGRATED DESIGN PROJECT/ PROJEK REKA BENTUK BERSEPADU (BMIU 3804)

LEARNING OUTCOMES

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

1. Define problem, objectives and scope of the project.
2. Design the project and solution using appropriatetools.
3. Demonstrate the project management skills through design project findings

SYNOPSIS

This course develops the student's competence and self-confidence as designers. Design projects are drawn from manufacturing engineering problems. The aims of this course is to expose students with design and research methodology which consists of project background, literature review, project methodology, design, analysis and presentation. The design projects must incorporate engineering standards and realistic constraints that include economic, environmental, sustainability, manufacturability, ethical, health and safety.

REFERENCES

- Ulrich, K. (2012) Product Design and Development, 5th Edition McGraw Hill.
- Walker, D.J. (2000) Creative Techniques in Product and Engineering Design: A Practical Workbook, Woodhead Publication, Abington, Cambridge.
- Matthews, C. (1998) Case Studies in Engineering Design, London: Arnold.

PROGRAM CORE COURSES (BMID)

STATICS/STATIK (BMID 1313)

LEARNING OUTCOMES

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

1. Describe the physical sciences of statics concepts
2. Construct statics experiments to recognize theengineering 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

- Hibbeler, R.C. (2016) Statics and Mechanics of Materials, 14th SI Edition, Prentice Hall, New York.
- Beer, F. P., Johnston jr., E. R., Eisenberg, E. R., (2016)
- Vector Mechanics for Engineers - Statics, 11th Editionin SI units, McGraw Hill, New York.
- Meriam, J. L., Kraige L. G. (2008) Engineering Mechanics
- - Static SI Version, 6th Edition., John Wiley& Sons, New York.
- Pytel, Kiusaalas. (2009). Engineering Mechanics- Static. 3rd Ed. Cengage Learning.
- Michael P., Gary, G., Constanzo, F., (2009). Engineering Mechanics - Statics. Mcgraw-Hill Higher Education.

ENGINEERING DRAWINGS & CAD/ LUKISAN KEJURUTERAAN & CAD (BMID 1303)

LEARNING OUTCOMES

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

1. Explain the principles of engineering drawing and Computer Aided Design (CAD).
2. Generate 2D and 3D freehand sketching.
3. Construct engineering drawing using CAD software.

SYNOPSIS

The purpose of this course is to provide students with an understanding of the importance of engineering graphic communication to the design process and interpretingthe engineering drawings. Students will gain hands- on experience creating freehand technical sketches, CAD technical drawings using orthographic projections, sections auxiliary views and isometric drawings. Emphasisis placed on creating drawings that are neat, correctly dimensioned using industry standards. Students will use freehand sketches methods and CAD software to developvisualization skills and create engineering drawings. This course consists of lectures and practical session. A major part of the course consists of performing structured laboratory exercises. Classroom activities will complementand support the lab exercises with explanations and demonstrations of required activities.

REFERENCES

- Ashleigh Fuller, Antonio Ramirez, Douglas Smith. Technical Drawing 101 With Autocad 2017
- David A. Madsen and David P. Madsen, Engineering Drawing And Design, 6th edition, 2016
- Giesecke, Mitchell, Spencer, Hill, Dygdon, Novak, Technical Drawing With Engineering Graphics, 14th Edition, Prentice Hall, 2012.
- Dix Riley, Discovering Autocad 2009, Pentice Hall, 2009.

PRINCIPLE OF ELECTRIC AND ELECTRONIC/ PRINSIP ELEKTRIK DAN ELEKTRONIK (BMIW 1313)

LEARNING OUTCOMES

At the end of this course, 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 the topics of electrical and electronic components, emphasizing electric circuit theory such as components and measurement instruments, circuit analysis. For electronic principles, itwill cover the topics of electronic devices such as operational amplifiers and digital electronics it will deal with topics such as system numbers, logic gates, Booleanoperation, combination logic circuits, and digital circuit application.

REFERENCES

- Allan, R., H. (2014) Electrical Engineering, Pearson Education
- Thomas L. Floyd (2010) Principles of Electric Circuits,
- 9th Edition, Prentice Hall.
- Thomas L. Floyd (209) Digital Fundamental, 10th Edition, Pearson Education.
- Alexander, C.K., (2008) Fundamental Of Electric Circuit, McGraw Hill.
- Nilsson, J. W., Riedel, S. A., (2008) Electric Circuit, Prentice Hall
- Roger, T., (2008) Digital Electronics Principles & Applications, McGraw Hill.

ADVANCED ENGINEERING GRAPHICS & CAD/ GRAFIK KEJURUTERAAN LANJUTAN & CAD (BMID 2504)

LEARNING OUTCOMES

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

1. Explain the basic concepts of 3D modelling and its application in design process.
2. Construct assembly model.
3. Design parametric modelling using advance CADtool.

SYNOPSIS

The purpose of this course is to provide students with an understanding of the importance of engineering graphic communication to the design process and interpreting the engineering drawings. Students will gain hands-on experience creating freehand technical sketches, CAD technical drawings using orthographic projections, sections auxiliary views and isometric drawings. Emphasisis placed on creating drawings that are neat, correctly dimensioned using industry standards. Students will use freehand sketches methods and CAD software to develop visualization skills and create engineering drawings. This course consists of lectures and practical sessions. A major part of the course consists of performing structured laboratory exercises. Classroom activities will complementand support the lab exercises with explanations and demonstrations of required activities.

REFERENCES

- Planchard, D.C., (2017), Engineering Design WithSolidWorks 2017, Sdc.
- Bethune, J.D., (2016) Engineering Design AndGraphics
- With SolidWorks 2016 3.
- Shih, R. (2018) SolidWorks 2018 and EngineeringGraphics: An Integrated Approach, Sdc.

DYNAMICS & MECHANICS OF MACHINE/ DINAMIK & MEKANIK MESIN (BMID 2333)

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. Demonstrates the dynamics and mechanics of machine laboratory experiments
3. Convert 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. Transmissionsystem based on the friction of motion, such as belts, brakes and dibbles. Based delivery systems such as chainsand gear teeth. Gear system. Balancing the dynamic system that includes balancing the body rotating plane and a parallel plane. Balancing reciprocating motionas 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 consist of moving one degree of freedom. Free vibration. Damped free vibration. Forced damped vibration. Speed control of the cycle flywheel.

REFERENCES

- Beer, F. P., Johnson, E.R., Clausen, W. E., (2013) Vector Mechanics For Engineers, Dynamics Si Units, 10th Edition. McGraw-Hill.
- Hibbeler, R. C. (2013) Engineering Mechanics,Dynamics, 12th Edition. Prentice Hall.
- Meriam, J. L. And Kraige, L. G. (2013). Engineering Mechanics, SI Version, 6th Edition. John Wiley.
- Bedford, A. And Fowler, W. (2008). Engineering Mechanics: Dynamics (SI units). 5th Edition. Prentice Hall.
- Cleghorn, W. L., 2005, Mechanics of Machines, Oxford University Press.

ENGINEERING MATERIALS/BAHAN KEJURUTERAAN (BMIP 1313)

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 cover introduction to engineering materials, inter-atomic bonding, crystalline structure and imperfections in solid. Explanation on different types 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

- Callister W.D. and Rethwisch D.G, 2011, Fundamentals of Materials Science and Engineering, 8th Edition, John Wiley & Sons.
- Aludin Mohd Serah, 2017, Engineering Materials for Engineering Technologists Module 15, 3th Edition, Penerbit Universiti, Universiti Teknikal Malaysia Melaka.
- Smith W. F., 2011, Foundation of Materials Science and Engineering, 5th Edition, McGraw Hill.
- Askeland D. R., 2011, The Science and Engineering of Materials, 6th Edition, Cl-Engineering.

COMPUTER PROGRAMMING/ PENGATURCARAAN KOMPUTER (BMIW 1343)

LEARNING OUTCOMES

At the end of this course, students 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

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

- Gaddis, T., (2015), Starting Out with C++: From Control Structures through Objects, 8th Edition, Global Edition, Pearson Education.
- Daniel Liang, Y, (2014), Introduction to Programming with C++, 3RD Edition, Pearson Education.
- Deitel, H.D., (2014), C++ How to Program,9th Edition, Pearson Education.
- Nell, D., (2013), Programming and Problem Solving with C++: Comprehensive, 6th Edition, Jones & Bartlett Learning.
- Gregoire, M., (2011), Professional C++, 2nd Edition, John Wiley & Son.

MANUFACTURING PROCESS/ PROSES PEMBUATAN (BMIP 1323)

LEARNING OUTCOMES

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

1. Explain the fundamental concepts of manufacturing processes.
2. Differentiate the ability of various manufacturing processes.
3. Construct various skills of manufacturing techniques.

SYNOPSIS

In this module, students will be introduced to various manufacturing processes that can be categorized into three major focus areas: metal removal processes, near- net shape and forming processes and joining processes. 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 with fusion and solid-state welding.

REFERENCES

- Kalpakjian, S. and Schmid, R. (2014) Manufacturing Engineering and Technology, 7th Edition, Prentice Hall.
- Timing, R. and Tooley, M. (2001) Basic Manufacturing, 2nd edition, Newnes.
- Rao, P.N. (2000) Manufacturing Technology – Metal Cutting and Machine Tool, Mc Graw Hill.
- Schey, J.A. (2000) Introduction to Manufacturing Processes, 3rd edition, Mc Graw Hill.

THERMOFLUID/ TERMOBENDALIR (BMID 2313)

LEARNING OUTCOMES

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

1. Apply the thermodynamic Laws for common steady-flow device.
2. Solve various fluid flow problems using the fluid mechanics equations
3. Demonstrate the principles of thermodynamics and fluid mechanics through laboratory experiments.

SYNOPSIS

The course introduces the students to the basic engineering of thermodynamics that involved study on the energy transformation, working fluids, theory and application of first and second laws of thermodynamics. The course also covers explanations on the steam and gaspower plant as a direct application of the thermodynamic theory. Students will be exposed to refrigeration systems as an application on the thermodynamics principles. The second part of this course is to introduce the students to the basics of fluid mechanics. This consists of fluid's static and dynamic analysis, buoyancy and stability, Bernoulli equation, momentum principle, flow behavior in pipe and also covers the basic principle of dimensional analysis.

REFERENCES

- Cengel, Y.A., Turner, R. H. & Cimbala, J. M. (2017) Fundamentals of Thermal-Fluid Sciences, 5th Editionin SI Units, Mc Graw Hill.
- Kaminsky, D. A. & Jensen, M.K. (2005) Introduction toThermal and Fluid Engineering, John Wiley & Sons, Inc.
- Cengel, Y.A. & Michael, A.B. (2002) Thermodynamics: An
- Engineering Approach, 4th Edition, Mc Graw Hill.
- Eastop, T.D. & McConkey, A. (2004) Applied Thermodynamics
- for Engineering Technologist, 5th Edition, Longman.

SOLID MECHANICS/MEKANIK PEPEJAL (BMID 2323)

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 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

- Hibbeler R.C., 2013, Statics and Mechanics of Materials, 3rd SI Ed., Prentice Hall, New York.
- Beer. F.P. Et Al. 2012. Mechanics Of Materials, 6th Edition in SI Units. McGraw-Hill.
- Beer. F.P. Et Al. 2011. Statics and Mechanics of Materials, 1st Edition. McGraw-Hill.
- 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.
- Roy Craig Jr., 2011, Mechanics of Materials, 3rd Ed., John Wiley & Sons, New York.

MEASUREMENT AND INSTRUMENTATION/ PENGUKURAN DAN INSTRUMENTASI (BMIP 2503)

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 courses cover three main areas: dimensional metrology, measurement analysis, and surface/texture measurement. In dimensional metrology, students will be exposed to three types of measurements: linear, angle and geometrical. Besides that, measurement of screw thread also covered in this course. Students will be taught 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 requiredto 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

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

BMIP 2333 QUALITY CONTROL/KAWALAN KUALITI

LEARNING OUTCOMES

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

1. Explain the basic quality principles and practices, quality solving techniques and product reliability related to manufacturing process.
2. Solve the manufacturing process quality problem using quality solving techniques.
3. Performs the ability to apply the quality solving techniques such as SPC, QFD, FMEA and Six Sigma in order to improve quality.

SYNOPSIS

There are four main sections consisting in Quality and Reliability course: quality principles and practices; quality solving techniques; reliability and additional quality tools. In quality principle and practices, it covers quality basic, quality gurus, introduction to total quality management, and quality awards. Quality solving techniques will cover statistical process control (7 QC tools). In reliability, it explains life and reliability testing plans for product and process. Additional quality tools are Quality Function Deployment (QFD), Failure Mode Effect & Analysis (FMEA), Six Sigma and PDSA.

REFERENCES

- Montgomery D. C., (2009) Introduction to Statistical Quality Control, 6th Edition, John Wiley and Sons, Inc.
- Besterfield, D. H. (2014) Quality Improvement, 9th Edition, Pearson
- Bass, I (2014) Six Sigma Statisctic with Excel and Minitab, Mc Graw Hill.
- Besterfield, D.H., Besterfield-Minhna, C., Besterfield,
- G. H. and Besterfield-Sacre, M. (2014) Total Quality Management, 9th Edition, Prentice Hall.
- Yusuf, Y., Abdullah, R. And Abdul Rasib, A. H. (2019) Quality Control For Engineering Technologist, 2nd Edition.

CONTROL SYSTEM/SISTEM KAWALAN (BMIP 2343)

LEARNING OUTCOMES

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

1. Apply appropriate techniques in describing the characteristics of control systems in time domain.
2. Construct experiments to distinguish system performances of open loop and closed loop systems.
3. Report the analysis of transient and steady state performance for first and second order control systems.

SYNOPSIS

This course focuses on the fundamentals of control system theory. The system includes translational mechanical system, rotational mechanical system and electromechanical system, in linear and time invariant state. Students will also be exposed to solve stability and steady state problems in a system. Some of the methods used in solving these problems are dynamic system modelling, Laplace transform, block diagram and Routh- Hurwitz stability. Practical applications on how to use commercially available mathematical software to solve control problem will also be introduced.

REFERENCES

- Norman S. Nise, (2019). Control Systems Engineering, 6th Edition, John Wiley & Sons Inc.,
- Katsuhiko Ogata, (2010). Modern Control Engineering, 5th Edition, Pearson.
- Richard C. Dort, Robert H. Bishop (2011), Modern Control Systems, 12th Edition, Pearson.
- Gopal, M, (2012) Control Systems: Principles and Design, 4th Edition, Mc Graw Hill.
- Khalil Azha Mohd Annuar et. Al (2015)., Introduction to Control System, Penerbit UTeM.

PRODUCT DESIGN AND DEVELOPMENT/ REKA BENTUK DAN PEMBANGUNAN PRODUK (BMID 2324)

LEARNING OUTCOMES

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

1. Explain the principles of product design and development.
2. Organizes the product through the outcomes of analyze problems.
3. Ability to work effectively in group for process of product design and development.

SYNOPSIS

This course blends the perspectives of marketing, design and manufacturing into a single approach to product development. This course provides the students with real industrial practices and essential roles played by various members of product development teams. Throughout this course, various attempts are used to strike a balance between theory and practical.

REFERENCES

- H. Boejang, H. Attan, M.F. Basar, M.I Ramli, (2013) Module 4: Product Development for Engineering Technology, 1st Edition, Penerbit Universiti, UTeM, Melaka, Malaysia.
- Ulrich, K.T. & Eppinger, S.D. (2016) Product Design and Development, 6th Edition, McGraw Hill Irwin.
- Chitale, A.K. & Gupta, R.C. (2013) Product Design and Manufacture, 6th Prentice Hall, New Delhi, India.
- Kalpakjian, S. & Schmid, S.R. (2014), Manufacturing Engineering & Technology, 7th Edition, Prentice Hall.

CNC TECHNOLOGY/ TEKNOLOGI CNC (BMID 3523)

LEARNING OUTCOMES

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

1. Explain the proper use of CNC types, CNC models,and CNC coordinate system.
2. Perform CNC ISO Programming method by using SinuTrain Sinumeric 840D simulator.
3. Construct CNC ISO Programming for Lathe two (2)axis and Milling three (3) axes.

SYNOPSIS

This course covers the knowledge of CNC technology andbasics of CNC machining operations. Students will learn CAD/CAM and CNC machining using Mastercam softwareon PC based computers. The students will be exposed to the operation of CNC machines and methods of producing programming by using G-codes and M-codes.

REFERENCES

- Alan Overby, (2011) CNC Machining Handbook, TheMcGraw-Hill Companies.
- Michael Fitzpatrick, (2013) Machining and CNC Technology. 3rd Revision, McGraw-Hill Higher Education

INDUSTRIAL ENGINEERING/ KEJURUTERAAN INDUSTRI (BMIP 3354)

LEARNING OUTCOMES

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

1. Analyze the problems that are related to Industrial Engineering.
2. Solve manufacturing operation scenarios using Industrial Engineering tools and techniques.
3. Perform experiments or laboratory tasks related to topics discussed in IE.

SYNOPSIS

This course is an introduction to Industrial Engineering (IE). The course introduces fundamental concepts and techniques in IE covering two major areas that are production systems and optimization. In production systems, student will be taught to productivity concept, work study and measurements, facility planning, forecasting, material requirement planning, inventory control and production scheduling. In optimization, students will be exposed to queueing theory, simulation and modelling, lean manufacturing and project management.

REFERENCES

- Stevenson, W.J. (2015). Operations Management, 12th Edition. McGraw Hill.
- Heizer, J., and Render, B. (2014) Operations Management, Pearson.
- Abdullah, R, Mohamad, N.A, Kamat, S.R (2013). Modul: Industrial Engineering for Technologist Part 1 and Part 2. Penerbit UTeM.
- Garcia-Diaz, Alberto and Smith, J. MacGregor (2008). Facilities Planning & Design. Prentice Hall
- Arnold, J.R. Tony, Chapman, Stephen N. and Clive, Lloyd M. (2008). Introduction to Materials Management. Pearson International.
- Kelton, David W., Sadowski, Randall P., Sturrock, David T. (2007). Simulation with Arena. McGraw Hill.

COMPUTER AIDED MANUFACTURING/ PEMBUATAN TERBANTU KOMPUTER (BMID 2514)

LEARNING OUTCOMES

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

1. Apply basic principle CAD/CAM methodology into 2D, 3D, surface modelling and CAM operation.
2. Plan machining strategies and tool path methods for milling and turning operations.
3. Simulate machining operations prior to the machining process.

SYNOPSIS

This course is an introducing to the CAD/CAM system and its application in industry. The students will be exposed to the application of high-end CAD/CAM software for generating geometric modelling and partprogramming. The course covers generating 2D Graphic Elements, Geometric Modelling Systems, Generative/ Interactive Drafting, CAD and CAM Integration and CAD/ CAM Programming. By doing a group project, students will understand the link from CAD to CAM operation. Using CAD/CAM software, students will know how to simulate the part programming before starting the machining operation.

REFERENCES

- P. N. Rao, CAD/CAM Principles and Applications, 3rd Edition, McGraw-Hill, 2017.
- Zhuming Bi, Xiaqin, Computer Aided Design and Manufacturing, Wiley, 2020.
- M.M.M. Sarcar, K. Mallikarjuna Rao, K.lalit Narayan, Computer Aided Design and Manufacturing, Prentice Hall, 2008.

DESIGN FOR MANUFACTURING AND ASSEMBLY/REKA BENTUK PEMBUATAN DAN PEMASANGAN (BMID 3533)

LEARNING OUTCOMES

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

1. Explain the basic principles and methods of designing production tool in manufacturing field.
2. Apply the basic principles and methods of designing with current industrial practice.
3. Design efficient production tools for manufacturing, assembly and inspection processes.

SYNOPSIS

Design for Manufacture and Assembly (DFMA) is an approach of decision making in improving product design from the earliest concept design stages of a new product, based on concurrent engineering philosophy. The course structure exposes students to learn, understand and apply requirements of DFMA in ensuring the designof products that is easy and less expensive to manufacture and assemble, with retaining quality of product.

REFERENCES

- Boothroyd, G., Dewhurst, P. & Knight, W. (2011) Product Design for Manufacture and Assembly, 3rd. Edition Revised and Expanded, Marcel Dekker.
- Boothroyd, G. (2005) Assembly Automation And Product Design, 2nd Edition Crc Press Taylor & Francis Group
- Ulrich, K.T. & Eppinger, S.D. (2012) Product Design and Development, 5th Edition, McGraw Hill Irwin.
- O. Molly, S.Tilley & E.A Warmah, (2015) Design For Manufacturing And Assembly, Springer Science.

RAPID MANUFACTURING/ PEMBUATAN PANTAS (BMID 3543)

LEARNING OUTCOMES

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

1. Explain the process of the concurrent product development process and the roles of its tools and technologies.
2. Manipulate the application of concurrent product development tools and technologies in a particular product design and development activities
3. Perform best practices during concurrent product development project activities in terms of planning, tools and technologies application, and management.

SYNOPSIS

This is a 3-credit Hour course offered to all third-year students of the Department of Manufacturing Engineering,Faculty of Mechanical and Manufacturing Engineering Technology. Product development requires the building and testing of prototypes. A prototype approximates theproduct on one or more dimensions of interest. Prototypes are used for learning, communication, i9ntegration and milestones. This course will provide the study of different concurrent product development tools and technologies known as time compression technologies adopted by product developers of manufacturers.

REFERENCES

- H. Boejang, M.F. Basar (2013). Time Compression Technologies for Engineering Technology. 1st Edition, Published by Penerbit UTeM, Universiti Teknikal Malaysia Melaka. Malaysia.
- Hopkinson N. et al. (2014). Rapid manufacturing an Industrial Revolution for the Digital Age, Chicester:
- John Wiley & Sons.
- Wright P.L. (2001). 21st century Manufacturing Practice, Prentice-Hall.
- Pham D.T, (2001). Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid tooling, London: Springer.

ERGONOMICS DESIGN/ REKA BENTUK ERGONOMIK (BMID 3553)

LEARNING OUTCOMES

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

1. Apply ergonomics principles to create safe, healthy, efficient and effective activities in the workplace.
2. Analyze the effectiveness of the work system designed.
3. Constructs a design of work system by taken into consideration human capabilities and limitations.

SYNOPSIS

This course provides the students with the rationale for providing an occupationally safe and healthy work environment in industry. Three main elements of this course: human, equipment and work environment. These three elements are classified into different areas, however correlations of them are discussed and exemplified in each topic. Through human study, students will be explained about the human anthropometric, physiology, psychology as well as capabilities and limitations of human. Meanwhile, through ergonomic design of equipment, students will learn howto design the hand tools and workstations that are safe tothe users. Finally, the students also will be exposed on how to manage work environment such as thermal comfort, noise, etc. This will contribute better understanding to occupational health of industries.

REFERENCES

- Karl H.E. Kroemer. Introduction to Ergonomics / Human Factors Engineering, 7th Edition. 2017.
- Karwowski, W., (Editor), Applying Systemic- Structural Activity Theory to Design of Human- Computer Interaction Systems. Taylor & Francis, London, 2015.
- McCauley Bush, Pamela, Ergonomics Foundational Principles, Applications, and Technologies, Boca Raton, FLCRC Press, 2012.
- Wickens, C.D., An Introduction to Human Factors Engineering, 2nd Edition, Pearson Education International, 2013.

DESIGN OF MACHINE ELEMENT/ REKA BENTUK ELEMEN MESIN (BMID 3573)

LEARNING OUTCOMES
At the end of this course, students should be able to:
1. Apply the theory of common machine elements to design machine elements.
2. Analyze machine elements using finite element analysis.
3. Optimize the design of machine elements using finite element analysis.

SYNOPSIS
The course introduces students to the design and theory of common machine elements including clutches, brakes,bearings, springs and gears. It also gives students experience in solving design problems involving machine elements. Finite element analysis approach will also be introduced to analyze, evaluate and optimize the mechanical structure of machine elements.

REFERENCES

- Wei Jiang, 2019, Analysis and Design of Machine Elements, John Wiley & Sons.
- Ansel C. Ugural, 2018, Mechanical Design of Machine Components: Siversion, Taylor & Francis.
- Budynas, R.G. & Nisbet J.K., 2014, Mechanical Engineering Design, 10th Edition, Mc Graw Hill, Singapore.
- Juvinall, R.C. Andmarshek, K.M., (2012) Machine Component Design, 5th Edition.
- Robert L. Norton (2014). Machine Design: An Integrated Approach, 5th Edition, Prentice Hall.

PRODUCTION TOOL DESIGN/ REKA BENTUK ALAT PENGELUARAN (BMID 3563)

LEARNING OUTCOMES
At the end of this course, students should be able to:
1. Explain the basic principles and methods of designing production tool in manufacturing field.
2. Apply the basic principles and methods of designing with current industrial practice.
3. Design efficient production tools for manufacturing, assembly and inspection processes.

SYNOPSIS
This course is an introduction to the basic principles and methods of designing production tools such as jigs and fixtures for material removal processes, manual work operations, joining processes and inspection processes. The students will be exposed to the application of industrial work holding devices, drawings and designs. The working drawings will be aided by engineering drawing standards, company catalogues and handbooks. The jigs and fixtures focus on the locating elements such as clamping elements, tool guiding and setting elements. In this course,students will also use CAD software.

REFERENCES

- Hoffman, Peter J. (2013). Si Metric precision machining technology. Clifton Park, NY: Cengage Learning
- Hoffman, E.G. (2002) Jig & Fixture Design, 5th Edition, Delmar Publisher.
- Joshi, P.H. (2003) Jigs and Fixtures Design Manual, 2nd Edition, McGraw-Hill.
- Orady, E. (2008) Jigs & Fixtures Design, Workshop Material, BATC UTM.

SUSTAINABLE DEVELOPMENT/ PEMBANGUNAN LESTARI (BMID 4013)

LEARNING OUTCOMES

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

1. Explain the interrelationship between resource supply and sustainability in economic, environmental, and social contexts, using examples from current sustainability challenges.
2. Create sustainable product designs that minimize environmental impact while addressing real-world sustainability challenges through appropriate tools, ethical and professional practices.
3. Analysing the environmental impacts of products throughout their life cycle and making design choices in support of the United Nations Sustainable Development Goals particularly SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action)

SYNOPSIS

Sustainable or green product design integrates environmental, social, and economic considerations into the product development process to support the goals of sustainable development. This approach aims to minimize environmental impact using renewable resources, reduction of waste and emissions, and responsible material selection. It also promotes design practices that improve human well-being while protecting ecosystems, aligning with global sustainability objectives such as those outlined in the United Nations Sustainable Development Goals (SDGs), particularly SDG 9, SDG 12, and SDG 13.

REFERENCES

- Adisa Azapagic, Slobodan Perdan, Sustainable Development in Practice. Wiley - Blackwell, 2011
- David T.Allen, david R.Shonnard, Sustainable Engineering: Concepts, Design and Case studies, Prentice Hall 2012
- J. Paulo Davim, Sustainable Manufacturing , John Wiley and Sons, Inc., 2010
- M K Ghosh Roy, Sustainable Development: environment , energy and water resources, Ane Books Pvt. LLtd,2011
- Frederic P Miller, Agnes F Vandome, John McBrewster, Design for Environment, VDM Publishing House Ltd., 2010
- Michael F. Ashby, Materials and Sustainable Development, Butterworth- Heinemann Publishing, Elsevier Ltd. 2016
- Jonathan Chapman, Routledge Handbook of Sustainable Product Design, Taylor & Francis, 2019

COMPUTER AIDED ENGINEERING/ KEJURUTERAAN BERBANTU KOMPUTER (CAE) (BMID 3583)

LEARNING OUTCOMES

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

1. Explain the basic principles of finite element analysis in industrial practices.
2. Apply finite element modelling and equation to solve mechanical structure and fluid flow problem in design.
3. Demonstrate finite element analysis using CAD/CAE software.

SYNOPSIS

The course will introduce the students to the fundamentalconcepts of the finite element method and analysis inthe context of practical application with emphasis on the engineering issues

REFERENCES

- Chandrupatla T.R and Belgundu, A.D (1997), Introduction to the Finite Elements in Engineering, 2nd Edition, Prentice Hall, New Jersey
- Huebner K.H and Dewhirst D.L(2001), The finite Element Method for Engineers, 4th Edition, John Wiley and Sons Inc, Toronto Canada
- Cook R.D (1995), Finite Element Modeling for Stress Analysis, John Wiley and Son Inc
- Logan D.L (2002), A First Course in the Finite Element Method, 3rd Edition Brooks/Cole, Pacific Grove, CA

BACHELOR DEGREE PROJECT I/ PROJEK SARJANA MUDA I (BMIU 3764)

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.
6. Conduct systematic investigation through literature review, analyzing past studies and interpreting technical information to support early project development.

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 statements, literature review, and methodology to overcome theproblem. The student needs to achieve the objective of theproject and present it in the report.

REFERENCES

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

BACHELOR DEGREE PROJECT II/PROJEK SARJANAMUDA II (BMIU 4774)

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.
6. Conduct systematic investigation, analyze experimental data, and interpret results to validate the project findings.

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

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

PRE-REQUISITE

BMIU 3764

BACHELOR DEGREE PROJECT I/PROJECT SARJANA MUDA I

INDUSTRIAL TRAINING/ LATIHAN INDUSTRI (BMIU 47812)

LEARNING OUTCOME

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

1. Apply engineering technology knowledge and skills in carrying out workplace activities and responsibilities.
2. Utilise appropriate engineering technology tools, techniques, and resources in performing assigned tasks.
3. Evaluate engineering technology practices in the workplace with consideration of sustainability and societal responsibilities.
4. Demonstrate effective teamwork and professional conduct in accomplishing workplace responsibilities.
5. Communicate workplace activities and technical information effectively using appropriate oral and written communication methods.
6. Demonstrate continuous learning and professional development through reflective evaluation of industrial training experiences.

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

- UTeM Guideline Handbook for Industrial Training.

ELECTIVE BMID

MANUFACTURING SYSTEM/ SISTEM PEMBUATAN (BMIP 3814)

LEARNING OUTCOMES

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

1. Solve manufacturing system problems using simulation approach.
2. Construct models of discrete event simulation for various manufacturing systems
3. Demonstrate manufacturing system simulation using simulation software

SYNOPSIS

Modelling and simulation introduce the students to principles and techniques of discrete event simulation. This is a powerful system tool for analyzing a wide variety of complex engineering and business problems. Students will learn to model a real system, use the main computational and programming instruments, and simulation language, to program the model. Students also will be exposed to design and evaluate simulation experiments.

REFERENCES

- Harrington, H.J. and Kerim T. (2000) Simulation Modeling Methods: To Reduce Risks and Increasing Performance, McGraw Hill.
- Severance, F. L. (2001) System Modeling and Simulation: An Introduction, John Wiley & Sons.
- Averill, L. and Kelton, W.D., (1999) Simulation Modeling and Analysis (Industrial Engineering and
- Management Science Series), 3rd Edition, McGraw Hill Science/Engineering/Math.

PACKAGING DESIGN & TECHNOLOGY/ REKABENTUK & TEKNOLOGI PEMBUNGKUSAN (BMID 4834)

LEARNING OUTCOMES

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

1. Explain the type, material and processes for packaging.
2. Analyze the packaging economics that abide packaging laws and regulations.
3. Design basics graphic and package based on material selection and marketing requirements.

SYNOPSIS

Packaging Design and Technology presents an overall of packaging and incorporates many disciplines to enable students to adequately convey and coordinate packaging activities. The course covers topics of introduction to packaging, fundamental components of packaging, essential elements of physical distribution, properties and sensitivity of different products, package system performance selection and packaging as marketing tool. The design aspects are also covered.

REFERENCES

- Luke, H. The Packaging and Design Templates Sourcebook (Graphic Design), RotoVision. 2007.
- Kit L. Yam. The Wiley Encyclopedia of Packaging Technology, J. Wiley & Sons 2009.
- Klimchuk, Marianne Rosner, Packaging Design: Successful Product Branding from Concept to Shelf.
- Hoboken, NJ: John Wiley 2006.
- Steven D. and John S. Package Design Work Book: The Art and Science of Successful Packaging. Rockportu Publisher 2011.
- Soroka, W. 4nd edition. Fundamental of Packaging Technology, DEStech Publication. Inc 2009.

MOULD DESIGN/ REKABENTUK ACUAN (BMID 4814)

LEARNING OUTCOMES
At the end of this course, student should be able to:
1. Classify requirements for a mould.
2. Design mould layout.
3. Perform a runner and gating system selection.

SYNOPSIS
This course is an introduction to the basic principles and method of designing mould components such as cavity, core, sprue, cooling system, gate and ejectors system. The students will be exposed to the application of industrialwork holding devices, drawing engineering standards, design catalogs and mold design handbooks.

REFERENCES

- Herbert Rees, (2011) Mold Engineering 2nd Edition,
- Hoffman, E.G. (2002) Jig & Fixture Design, 5th Edition, Delmar Publisher.
- Joshi, P.H. (2003) Jigs and Fixtures Design Manual, 2nd Edition, McGraw-Hill.
- Orady, E. (2008) Jigs & Fixtures Design, Workshop Material, BATC.

AUTOMOTIVE COMPONENT MANUFACTURING/ PEMBUATAN KOMPONEN AUTOMOTIF (BMID 4824)

LEARNING OUTCOMES
At the end of this course, student should be able to:
1. Apply the knowledge of design and material processing to produce automotive components for supporting the automotive ecosystem.
2. Builds the automotive components at the final prototype stage by using software and machinery.
3. Shares the knowledge of automotive manufacturing new technology among students.

SYNOPSIS
This course provides strong fundamental concepts and techniques related to various types of finishing methods that are applied in automotive industries. This course covers three major techniques used in finishing process such as machine process, joining process and surface treatment. The course is practically oriented where students apply their knowledge as well as capable of operating the relevant equipment.

REFERENCES

- Serope Kalpakjian, (2014) Manufacturing Engineering & Technology, 7th edition, Prentice Hall.
- R.L. Timings, (1998) Manufacturing Technology, vol 1, 3rd edition, Wesley Longman.
- P.N RAO, (2000) Manufacturing Technology-Metal cutting & Machine Tools, McGraw Hill.
- H.S .Bawa, (2004) Manufacturing processes, McGraw Hill.
- Robert. GmBH, (2005) Automotive Handbook, 6th edition. Society of Automotive Engineer (SAE) McGraw Hill, 2005.

IOT IN MANUFACTURING/IOT DALAM PEMBUATAN (BMIP 4834)

LEARNING OUTCOMES

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

1. Use the basic principle and technique of Internet of Things to solve problems in manufacturing application.
2. Design the IoT-based project and solution using appropriate techniques and modern tools in manufacturing application.
3. Demonstrate the project management skills as a member and leader in a team through project findings and solutions.

SYNOPSIS

Internet of Things is considered by many as the most disruptive revolution, primarily driven by the need of organizations and people to be able to follow objects and make them communicate. The Internet of Things has shown rapid evolution with widespread technical, social, and economic impact. This has resulted in a paradigm shift, machines taking over the role of human beingswhen it comes to data generation and usage. Industrial automation and smart manufacturing involve use of a myriad of technologies like big data, predictive analytics, and virtualized process modeling and simulation to create value from data by streamlining data and factory operations. This course aims to provide a general overview of implementing IoT, especially in manufacturingdomain. It emphases practical issues and application of IoT on manufacturing challenges. The focus will be placed on designing the IoT solution in manufacturing use cases using IoT hardware and software toward intelligent action. Topics of discussion include Introduction to IoT technology; IoT architecture; communication technology for IoT; IoT and data analytics, IoT-enabled manufacturing system.

REFERENCES

- Internet of Things Approach and Applicability in Manufacturing - Ravi Ramakrishnan - CRC Press, [2019]
- IoT Concepts and Applications - Mansaf Alam, Springer, [2020]
- Optimization of Manufacturing Systems Using the Internet of Things - Yingfeng Zhang, Academic Press, [2016].
- Industrial Internet of Things Cybermanufacturing Systems - Sabina Jeschke, Springer [2017]

INDUSTRIAL DESIGN/ REKABENTUK INDUSTRI (BMID 3804)

LEARNING OUTCOMES

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

1. Explain a systematic approach to the design process in studio projects.
2. Apply design and creative skills learned in one studio to problems encountered in the new context of a successive studio.
3. Demonstrate proficiency in model-making techniques using various materials.

SYNOPSIS

Industrial design deals with the planning and development for production of a variety of objects and interrelated systems. Consumer appliances, tools, safety equipment, business machines, furniture, medical equipment, architectural products, and transportation devices make up a partial list of those areas of specialization in industrial design. Industrial design falls within a broader category of design, which is the professional area of activity concerned with planning and developing a wide variety of objects and spaces. Relationships among the users of the designed item, the efficient production of the designed item, and the aesthetic characteristics of the designed item are of particular importance.

REFERENCES

- Chengalur, S.N., Rodgers, S.H. & Bernard, T.E. (2004) Kodak's Ergonomic Design for People at Work, 2nd Edition, Wiley.
- Wickens, C.D. (2004) An Introduction to Human Factors Engineering, 2nd Edition, Pearson Education International.
- Cacciabue, P.C. (2004) Guide to Applying Human Factors Methods: Human Error and Accident Management in Safety-Critical Systems, Springer.
- Radwin, R.S. (2007) Lecture Notes on IE 564 (Ergonomics and Occupational Safety), University of Wisconsin – Madison.
- Smith, M. (2006) Lecture Notes on IE 342 (Introduction to Human Factors), University of Wisconsin – Madison.

PROGRAM CORE COURSES (BMIP)

STATICS/STATIK (BMID 1313)

LEARNING OUTCOMES

At the end of this course, 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 work.

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

- Hibbeler, R.C. (2016) Statics and Mechanics of Materials, 14th SI Edition, Prentice Hall, New York.
- Beer, F. P., Johnston jr., E. R., Eisenberg, E. R., (2016) Vector Mechanics for Engineers - Statics, 11th Editionin si units, McGraw Hill, New York.
- Meriam, J. L., Kraige L. G. (2008) Engineering Mechanics - Static SI Version, 6th Edition., John Wiley& Sons, New York.
- Pytel, Kiusaalas. (2009). Engineering Mechanics-Static. 3rd Ed. Cengage Learning.
- Michael P., Gary, G., Constanzo, F., (2009). Engineering Mechanics - Statics. McGraw-Hill Higher Education.

ENGINEERING DRAWINGS & CAD (BMID 1303)

LEARNING OUTCOMES

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

1. Explain the principles of engineering drawing and Computer Aided Design (CAD).
2. Generate 2D and 3D freehand sketching.
3. Construct engineering drawing using CAD software.

SYNOPSIS

The purpose of this course is to provide students with an understanding of the importance of engineering graphic communication to the design process and interpreting the engineering drawings. Students will gain hands- on experience creating freehand technical sketches, CAD technical drawings using orthographic projections, sections auxiliary views and isometric drawings. Emphasis placed on creating drawings that are neat, correctly dimensioned using industry standards. Students will use freehand sketches methods and CAD software to developvisualization skills and create engineering drawings. This course consists of lectures and practical sessions. A major part of the course consists of performing structured laboratory exercises. Classroom activities will complementand support the lab exercises with explanations and demonstrations of required activities.

REFERENCES

- David L. Goetsch (2016) Technical drawing and
- engineering communication. 6th Edition Clifton Park, NY: Delmar Cengage Learning.
- Giesecke, M., Spencer, H. & Dygdon, N. (2009) Technical
- Drawing, 14th Edition, Prentice Hall.
- Riley, D. (2012) Discovering AutoCAD 2006, Pentice Hall.
- McAdam, D. & Winn, R. (2003) Engineering Graphics,2nd Edition, Pearson Education Canada Inc.
- Marjom, Z. & Attan, H. (2008) Engineering Graphics & CADD, for Engineering Students, FKP, UTeM.

MANUFACTURING PRACTICE/AMALAN PEMBUATAN (BMIP 1303)

LEARNING OUTCOMES

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

1. Describe proper use of all equipment andrequirement
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 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

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

PRINCIPLE OF ELECTRIC AND ELECTRONIC/ PRINSIP ELEKTRIK DAN ELEKTRONIK (BMIW 1313)

LEARNING OUTCOMES

At the end of this course, 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 the topics of electrical and electronic components, emphasizing electric circuit theory such as components and measurement instruments, circuit analysis. For electronic principles, 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 circuitapplication.

REFERENCES

- Allan, R., H. (2014) Electrical Engineering, Pearson Education
- Thomas L. Floyd (2010) Principles of Electric Circuits, 9th Edition, Prentice Hall.
- Thomas L. Floyd (209) Digital Fundamental, 10th Edition, Pearson Education.
- Alexander, C.K., (2008) Fundamental of Electric Circuit, Mcgraw Hill.
- Nilsson, J. W., Riedel, S. A., (2008) Electric Circuit, Prentice Hall
- Roger, T., (2008) Digital Electronics Principles & Applications, Mcgraw Hill.

DYNAMICS & MECHANICS OF MACHINE/ DINAMIK & MEKANIK MESIN (BMID 2333)

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. Demonstrates 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 dibbles. 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 reciprocating motionas 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 consist of moving one degree of freedom. Free vibration. Damped free vibration. Forced damped vibration. Speed control of the cycle flywheel

REFERENCES

- Beer, F. P., Johnson, E.R., Clausen, W. E., (2013) Vector Mechanics For Engineers, Dynamics Si Units, 10th Edition. McGraw-Hill.
- Hibbeler, R. C. (2013) Engineering Mechanics, Dynamics, 12th Edition. Prentice Hall.
- Meriam, J. L. And Kraige, L. G. (2013). Engineering Mechanics, SI Version, 6th Edition. John Wiley.
- Bedford, A. And Fowler, W. (2008). Engineering
- Mechanics: Dynamics (SI units). 5th Edition. Prentice Hall.
- Cleghorn, W. L., 2005, Mechanics of Machines, Oxford University Press.

ENGINEERING MATERIALS/BAHAN KEJURUTERAAN (BMIP 1313)

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 cover introduction to engineering materials, inter-atomic bonding, crystalline structure and imperfections in solid. Explanation on different types 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

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

COMPUTER PROGRAMMING/ PENGATURCARAAN KOMPUTER (BMIW 1343)

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

- Gaddis, T., (2015), Starting Out with C++: From Control Structures through Objects, 8th Edition, Global Edition, Pearson Education.
- Daniel Liang, Y, (2014), Introduction to Programming with C++, 3RD Edition, Pearson Education.
- Deitel, H.D., (2014), C++ How to Program,9th Edition, Pearson Education.
- Nell, D., (2013), Programming and Problem Solving with C++: Comprehensive, 6th Edition, Jones & Bartlett Learning.
- Gregoire, M., (2011), Professional C++, 2nd Edition, John Wiley & Son.

MANUFACTURING PROCESS/ PROSES PEMBUATAN (BMIP 1323)

LEARNING OUTCOMES

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

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

SYNOPSIS

In this module, students will be introduced to various manufacturing processes that can be categorized into three major focus areas: metal removal processes, near- net shape and forming processes and joining processes. 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.

REFERENCES

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

THERMOFLUID/ TERMO BENDALIR (BMID 2313)

LEARNING OUTCOMES

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

1. Apply the thermodynamics First Law and Second law for common steady-flow device.
2. Solve various fluid flow problems using the Bernoulli Equation
3. Demonstrate the principles of thermodynamics and fluid mechanics through laboratory experiments.

SYNOPSIS

The course introduces the students to the basic engineering of thermodynamics that involved study on the energy transformation, working fluids, theory and application of first and second laws of thermodynamics. The course also covers explanations on the steam and gas power plant as a direct application of the thermodynamic theory. Students will be exposed to refrigeration systems as an application on the thermodynamics principles. The second part of this course is to introduce the students to the basics of fluid mechanics. This consists of fluid's static and dynamic analysis, buoyancy and stability, Bernoulli equation, momentum principle, flow behavior in pipe and also covers the basic principle of dimensional analysis.

REFERENCES

- Cengel, Y.A., Turner, R. H. & Cimbala, J. M. (2012)
- Fundamentals of Thermal-Fluid Sciences, 4th Edition in SI Units, Mc Graw Hill.
- Kaminsky, D. A. & Jensen, M.K. (2005) Introduction to Thermal and Fluid Engineering, John Wiley & Sons, Inc.
- Cengel, Y.A. & Michael, A.B. (2002) Thermodynamics:
- An Engineering Approach, 4th Edition, Mc Graw Hill.
- Eastop, T.D. & McConkey, A. (2004) Applied
- Thermodynamics for Engineering Technologist, 5th Edition, Longman.

SOLID MECHANICS/ MEKANIK PEPEJAL (BMID 2323)

LEARNING OUTCOMES

Upon completion of this course, students 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

Introduction to various types of structures and supports. Concepts of stress, strain, shear force and bending moments. Theory on beam deflection. Theory on torsion. Shear flow. Combination of loads. Deflection of beams

REFERENCES

- Hibbeler R.C., 2013, Statics and Mechanics of Materials, 3rd SI Ed., Prentice Hall, New York.
- Beer. F.P. Et Al. 2012. Mechanics Of Materials, 6th Edition in SI Units. McGraw-Hill.
- Beer. F.P. Et Al. 2011. Statics and Mechanics of Materials, 1st Edition. McGraw-Hill.
- 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.
- Roy Craig Jr., 2011, Mechanics of Materials, 3rd Ed., John Wiley & Sons, New York.

MEASUREMENT AND INSTRUMENTATION/ PENGUKURAN DAN INSTRUMENTASI (BMIP 2503)

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 courses cover three main areas: dimensional metrology, measurement analysis, and surface/texture measurement. In dimensional metrology, students will be exposed to three types of measurements: linear, angle and geometrical. Besides that, measurement of screw thread also covered in this course. Students will be taught 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 requiredto 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

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

QUALITY CONTROL/ KAWALAN KUALITI (BMIP 2333)

LEARNING OUTCOMES
At the end of this course, students should be able to:
1. Explain the basic quality principles and practices, quality solving techniques and product reliability related to manufacturing process.
2. Solve the manufacturing process quality problem using quality solving techniques.
3. Perform the ability to apply the quality solving techniques such as SPC, QFD, FMEA and Six Sigma in order to improve quality.

SYNOPSIS
There are four main sections consisting in Quality and Reliability course: quality principles and practices; quality solving techniques; reliability and additional quality tools. In quality principle and practices, it covers quality basic, quality gurus, introduction to total quality management, and quality awards. Quality solving techniques will cover statistical process control (7 QC tools). In reliability, itexplains life and reliability testing plans for product and process. Additional quality tools are Quality Function Deployment (QFD), Failure Mode Effect & Analysis (FMEA), Six Sigma and PDSA.

REFERENCES

- Montgomery D. C., (2009) Introduction to Statistical Quality Control, 6th Edition, John Wiley and Sons, Inc.
- Besterfield, D. H. (2014) Quality Improvement, 9th Edition, Pearson
- Bass, I (2014) Six Sigma Statisctic with Excel and Minitab, Mc Graw Hill.
- Besterfield, D. H., Besterfield-Minhna, C., Besterfield, G. H. and Besterfield-Sacre, M. (2011) Total Quality Management, 3rd Edition, Prentice Hall.

CONTROL SYSTEM/ SISTEM KAWALAN (BMIP 2343)

LEARNING OUTCOMES

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

1. Apply appropriate techniques in describing the characteristics of control systems in time domain.
2. Construct experiments to distinguish system performances of open loop and closed loop systems.
3. Report the analysis of transient and steady state performance for first and second order control systems.

SYNOPSIS

This course focuses on the fundamentals of control system theory. The system includes translational mechanical system, rotational mechanical system and electromechanical system, in linear and time invariant state. Students will also be exposed to solve stability and steady state problems in a system. Some of the methods used in solving these problems are dynamic system modelling, Laplace transform, block diagram and Routh- Hurwitz stability. Practical applications on how to use commercially available mathematical software to solve control problem will also be introduced.

REFERENCES

- Norman S. Nise, (2011). Control Systems Engineering, 6th Edition, John Wiley & Sons Inc.,
- Katsuhiko Ogata, (2010). Modern Control Engineering, 5th Edition, Pearson.
- Richard C. Dort, Robert H. Bishop (2011), Modern Control Systems, 12th Edition, Pearson.
- Gopal, M. (2012) Control Systems: Principles and Design, 4th Edition, Mc Graw Hill.
- Khalil Azha Mohd Annuar et. Al (2015)., Introduction to Control System, Penerbit UTeM.

CAD/ CAM (BMIP 2514)

LEARNING OUTCOMES

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

1. Explain CAD/CAM systems and applications in industrial manufacturing.
2. Construct basic principles CAD/CAM methodology into 2D, 3D, surface modelling and CAM operation.
3. Manipulate machining strategies and toolpath methods for milling or turning operations for a given part.

SYNOPSIS

This course is an introducing to the CAD/CAM system and its application in industry. The students will be exposed to the application of high-end CAD/CAM software for generating geometric modelling and part programming. The course covers generating 2D Graphic Elements, Geometric Modelling Systems, Generative/ Interactive Drafting, CAD and CAM Integration and CAD/ CAM Programming. By doing a group project, students will understand the link from CAD to CAM operation. Using CAD/CAM software, students will know how to simulate the part programming before starting the machining operation.

REFERENCES

- Michel Michaud, CATIA Core Tools: Computer Aided Three-Dimensional Interactive Application, 1st Edition, McGraw Hill, 2012.
- Rao, P.N. (2017) CAD/CAM Principles and Applications, 3rd Edition, McGraw Hill.
- Chang T.C., Wysk, R.A. & Wang, H.P. (2006) Computer-Aided Manufacturing, 2nd Edition, Prentice Hall.
- McMahon, C. & Browne, J. (1998) CADCAM Principle, Practise and Manufacturing Management, 2nd Edition, Prentice Hall.

CNC TECHNOLOGY/ TEKNOLOGI CNC (BMID 3523)

LEARNING OUTCOMES

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

1. Explain the proper use of CNC types, CNC models,and CNC coordinate system.
2. Perform CNC ISO Programming method by using SinuTrain Sinumeric 840D simulator.
3. Construct CNC ISO Programming for Lathe two (2)axis and Milling three (3) axes.

SYNOPSIS

This course covers the knowledge of CNC technology andbasics of CNC machining operations. Students will learn CAD/CAM and CNC machining using Mastercam softwareon PC based computers. The students will be exposed to the operation of CNC machines and methods of producing programming by using G-codes and M-codes.

REFERENCES

- Alan Overby, (2011) CNC Machining Handbook, TheMcGraw-Hill Companies.
- Michael Fitzpatrick, (2013) Machining and CNC Technology. 3rd Revision, McGraw-Hill Higher Education

INDUSTRIAL ENGINEERING/ KEJURUTERAAN INDUSTRI (BMIP 3354)

LEARNING OUTCOMES

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

1. Analyze the problems that are related to Industrial Engineering.
2. Solve manufacturing operation scenarios using Industrial Engineering tools and techniques.
3. Conduct experiments or laboratory tasks related to topics discussed in IE.

SYNOPSIS

This course is an introduction to Industrial Engineering (IE). The course introduces fundamental concepts and techniques in IE covering two major areas that are production systems and optimization. In production systems, student will be taught productivity concepts, work study and measurements, facility planning, forecasting, material requirement planning, inventory control and production scheduling. In optimization, students will be exposed to queueing theory, simulation and modeling, lean manufacturing and project management.

REFERENCES

- Stevenson, W.J. (2015). Operations Management, 12th Edition. McGraw Hill.
- Heizer, J., and Render, B. (2014) Operations Management, Pearson.
- Abdullah, R, Mohamad, N.A, Kamat, S.R (2013). Modul: Industrial Engineering for Technologist Part 1 and Part 2. Penerbit UTeM.
- Garcia-Diaz, Alberto and Smith, J. MacGregor (2008). Facilities Planning & Design. Prentice Hall
- Arnold, J.R. Tony, Chapman, Stephen N. andClive, Lloyd M. (2008). Introduction to Materials Management. Pearson International.
- Kelton, David W., Sadowski, Randall P., Sturrock, David T. (2007). Simulation with Arena. McGraw Hill.

MATERIALS TESTING AND FRACTURE ANALYSIS/ PENGUJIAN BAHAN & ANALISIS PATAH (BMIP 3573)

LEARNING OUTCOMES

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

1. Analyze various methods of material testing and non-destructive analysis in manufacturing.
2. Construct mechanical testing of materials in manufacturing and service.
3. Perform non-destructive analysis of materials in manufacturing and service

SYNOPSIS

The course will introduce the student on how Identify the various methods of materials testing and able to explain the effects of external forces on the behavior of materials, and the test methods employed in determining various mechanical properties. Among the scope of the course are fundamental and characteristics of different types of failures in materials to apply the fracture mechanics principles to identify the types of fracture surfaces of different materials and able to perform failure analysis, to differentiate the types of failure and fracture of materials in manufacturing and service.

REFERENCES

- Norman E. Dowling (2013), Mechanical behavior of materials: engineering methods for deformation, fracture, and fatigue. 4th Edition. Boston, MA: Pearson
- P. Field Foster (2007). The mechanical testing of metals and alloys, SIR ISAAC PITMAN & SONS, LTD., USA
- Nicholas P Cheremisinoff, and Paul N Cheremisinoff (1995) Handbook of advanced materials testing, III SERIES, Materials engineering, MARECEL DEKKER INC., USA.1995

ADVANCED MANUFACTURING PROCESSES/ PROSES PEMBUATAN TERMAJU (BMIP 3533)

LEARNING OUTCOMES

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

1. At the end of this course, students should be able to: 1. Choose the most appropriate processes for a given product design, application and cost.
2. Performs some experiments based on the advanced manufacturing process lab sheet requirements.
3. Demonstrates correct steps in executing tasks/ projects related to advanced manufacturing process.

SYNOPSIS

The course consists of non-traditional manufacturing processes and material removal methods, which include manufacturing processes using lasers technology, electron beam, abrasive water jet, electro discharge machining and electro chemical machining. Moreover, it will also include the introduction to aerospace material machining, automotive stamping, coating technology and electronic manufacturing processes.

REFERENCES

- Serope Kalpakjian & Steve Schmid, (2014) Manufacturing Process and Technology, Prentice Hall
- Mikell, P.G. (2007) Fundamental of Modern Manufacturing Process, 3rd Edition, Prentice hall.
- Gregg, R. (2004) Modern Materials and Manufacturing Processes, Prentice Hall.
- Degarmo, B.K. (1997) Materials and Processes in Manufacturing, 8th Edition, Prentice hall.

MATERIAL SELECTION/ PEMILIHAN BAHAN (BMIP 2543)

LEARNING OUTCOMES

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

1. Solve materials and processing selection in product design and manufacturing.
2. Construct the suitability of a particular materials and processing method using data, chart and software.
3. Displays the right materials and processes to be used for products fabrication.

SYNOPSIS

This course integrates all types of engineering materials (metals, polymers, ceramics and composites) and its properties (modulus, strength, hardness and hardness etc.) for materials selection in any engineering design. Various processing techniques (shaping, joining and finishing etc.) are also summarized. Case study and project work are used to reinforce the concept and capabilities in applying selection of materials utilizing materials properties charts, data and software.

REFERENCES

- Ashby, M.F. (2016) Materials Selection In Mechanical Design, 5rd. Edition, Butterworth-Heinemann.
- Mahmoud M.F. (2013) Selection of Materials and Manufacturing Processes for Engineering Design, 3rd. Edition, Prentice Hall.
- Ashby, M.F. (2009) The art and Science of Material selection in Product design, Butterworth-Heinemann.

PRE-REQUISITE

BMIP 1313 ENGINEERING MATERIALS
/ BAHAN KEJURUTERAAN

JIG & FIXTURES/ JIG & LEKAPAN (BMIP 3563)

LEARNING OUTCOMES

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

1. Explain requirements for jigs and fixtures.
2. Design jigs and fixtures.
3. Implement locating and clamping principles.

SYNOPSIS

This course starts with the introduction of jigs and fixtures that are used to facilitate production works, making interchangeable pieces of work possible at a savings in cost production. Jigs and fixtures 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

- Hoffman, Peter J. (2013). Si Metric precision machining technology. Clifton Park, NY: Cengage Learning
- E.G. Hoffman (2004) Jig and Fixture Design 5th edition, Thomson Delmar Learning Publisher.
- E.K. Henriksen (1973) Jig and Fixture Design Manual, Industrial Press, New York

SUSTAINABLE DEVELOPMENT/ PEMBANGUNAN LESTARI (BMID 4013)

LEARNING OUTCOMES

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

1. Explain the interrelationship between resource supply and sustainability in economic, environmental, and social contexts, using examples from current sustainability challenges.
2. Create sustainable product designs that minimize environmental impact while addressing real-world sustainability challenges through appropriate tools, ethical and professional practices.
3. Analysing the environmental impacts of products throughout their life cycle and making design choices in support of the United Nations Sustainable Development Goals particularly SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action)

SYNOPSIS

Sustainable or green product design integrates environmental, social, and economic considerations into the product development process to support the goals of sustainable development. This approach aims to minimize environmental impact using renewable resources, reduction of waste and emissions, and responsible material selection. It also promotes design practices that improve human well-being while protecting ecosystems, aligning with global sustainability objectives such as those outlined in the United Nations Sustainable Development Goals (SDGs), particularly SDG 9, SDG 12, and SDG 13.

REFERENCES

- Adisa Azapagic, Slobodan Perdan, Sustainable Development in Practice. Wiley - Blackwell, 2011
- David T.Allen, david R.Shonnard, Sustainable Engineering: Concepts, Design and Case studies, Prentice Hall 2012
- J. Paulo Davim, Sustainable Manufacturing , John Wiley and Sons, Inc., 2010
- M K Ghosh Roy, Sustainable Development: environment , energy and water resources, Ane Books Pvt. LLtd,2011
- Frederic P Miller, Agnes F Vandome, John McBrewster, Design for Environment, VDM Publishing House Ltd., 2010
- Michael F. Ashby, Materials and Sustainable Development, Butterworth- Heinemann Publishing, Elsevier Ltd. 2016
- Jonathan Chapman, Routledge Handbook of Sustainable Product Design, Taylor & Francis, 2019

JOINING TECHNOLOGY/ TEKNOLOGI PENCANTUMAN (BMIP 3523)

LEARNING OUTCOMES

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

1. Demonstrate the characteristics of joining in terms of process, equipment and setup.
2. Analyze the quality of joints using testing methods.
3. Construct the Non-Destructive Testing (NDT) and Destructive Testing (DT) methods.

SYNOPSIS

Joining Process is another very important element in manufacturing and assembly processes. Nearly all products, from relatively simple to the most complex, are assembled from single parts or components. Therefore, this course covers each related joining process and its equipment, inclusive welding, brazing, soldering, adhesive bonding and mechanical fastening. Furthermore, its also provides an engineering application of using some of the equipment and tools for joining processes.

REFERENCES

- Serope Kalpakjian & Steve Schmid, (2014) Manufacturing Process and Technology, Prentice Hall
- Klas Weman & Gunnar Linden, (2006) MIG welding guide, Woodhead Publishing Limited.
- Jeffus L, (2004) Welding Principles and Application, Thomson.
- Howard C., (2002) Modern Welding Technology, Prentice Hall.

PRE-REQUISITE

BMIP 1323 MANUFACTURING PROCESES / PROSES PEMBUATAN

ADVANCED MACHINING/ PEMESINAN TERMAJU (BMIP 3584)

LEARNING OUTCOMES

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

1. Distinguish the basic operation principles and control systems of CNC Three-Axis and Five-Axis machining.
2. Construct CNC Five-Axis program for milling operations inclusive of indexing and simultaneous motions.
3. Solve a complete CNC Program for any given actual industrial examples.

SYNOPSIS

This course provides concepts and techniques to prepare students with advanced computer numerical control (CNC) and computer-aided manufacturing (CAM) applications. The course covers the following concepts and techniques: practice safety; apply mathematical concepts; interpret engineering drawings and control documents; recognize different manufacturing materials and processes; measure/ inspect; perform advanced machining; use verification and communication systems; and program using 5-axis CAM [computer-aided manufacturing] systems.

REFERENCES

- Mattson, M. (2010) CNC Programming Principles and Applications, Delmar.
- Krar, S., Gill, A., and Smid, P. (2000) Computer Numerical Control Simplified, Industrial Press Inc.
- Madison, J. (1996) CNC Machining Handbook, Industrial Press Inc.
- Mattson, M. (2002) CNC Programming Principles and Applications, Delmar.
- McGeough, J.A., (2001) Advanced Methods of Machining, 1st Edition, Springer, New York.

PRE-REQUISITE

BMIP 2514 CAD/CAM

PLASTIC TECHNOLOGY/ TEKNOLOGI PLASTIK (BMIP 3593)

LEARNING OUTCOMES

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

1. Apply the fundamental principles of polymer properties, application and processing.
2. Analyze various plastic processing technology application.
3. Construct the ability to produce plastic finish product through various processes.

SYNOPSIS

This course introduces engineering polymers, which covers its classifications (thermoplastic, thermoset and elastomer), mechanical, rheological and physical properties as well as polymer product processing. Basic concept of polymer blends and raw materials formulation are also included. Emphasis is made on polymer-based product manufacturing, relations between processing and final properties as well as environmental effects (disposal and recycling).

REFERENCES

- Robert A. Malloy. (2010). Plastic part design for injection molding: an introduction. 2nd Edition. Cincinati OH: Handser Pub.
- McCrum, N.G., Buckley, C.P. and Bucknall, C.B. (2004) Principles of Polymer Engineering, Oxford Science Publication.
- Brent, S.A. (2006) Plastics Materials and Processing, 2nd Edition, Butterworth Heinemann.
- Bahadur, P. and Sastry, N.V. (2005) Principles of Polymer Science, 2nd Edition, Alpha Science.
- Fried, J.R. (2003) Polymer Science & Technology, 2nd Edition, Prentice Hall.

INDUSTRIAL DESIGN/ REKABENTUK INDUSTRI (BMID 3804)

LEARNING OUTCOMES

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

1. Explain a systematic approach to the design process in studio projects.
2. Apply design and creative skills learned in one studio to problems encountered in the new context of a successive studio.
3. Demonstrate proficiency in model-making techniques using various materials.

SYNOPSIS

Industrial design deals with the planning and development for production of a variety of objects and interrelated systems. Consumer appliances, tools, safety equipment, business machines, furniture, medical equipment, architectural products, and transportation devices make up a partial list of those areas of specialization in industrial design. Industrial design falls within a broader category of design, which is the professional area of activity concerned with planning and developing a wide variety of objects and spaces. Relationships among the users of the designed item, the efficient production of the designed item, and the aesthetic characteristics of the designed item are of particular importance.

REFERENCES

- Chengalur, S.N., Rodgers, S.H. & Bernard, T.E. (2004) Kodak's Ergonomic Design for People at Work, 2nd Edition, Wiley.
- Wickens, C.D. (2004) An Introduction to Human Factors Engineering, 2nd Edition, Pearson Education International.
- Cacciabue, P.C. (2004) Guide to Applying Human Factors Methods: Human Error and Accident Management in Safety-Critical Systems, Springer.
- Radwin, R.S. (2007) Lecture Notes on IE 564 (Ergonomics and Occupational Safety), University of Wisconsin – Madison.
- Smith, M. (2006) Lecture Notes on IE 342 (Introduction to Human Factors), University of Wisconsin – Madison.

INDUSTRIAL TRAINING/ LATIHAN INDUSTRI (BMIU 47812)

LEARNING OUTCOME

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

1. Demonstrate technical competencies and skills gained throughout their internship .
2. Prepare a report on the industrial field daily activities in the logbook systematically.
3. Work effectively with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.
5. Produce industrial training report.
6. 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.

REFERENCES

- UTeM Guideline Handbook for Industrial Training.

BACHELOR DEGREE PROJECT I/ PROJEK SARJANAMUDA I (BMIU 3764)

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 statements, literature review, and methodology to overcome theproblem. The student needs to achieve the objective of theproject and presented it in the report.

REFERENCES

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

BACHELOR DEGREE PROJECT II/ PROJEK SARJANA MUDA II (BMIU 4774)

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

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

PRE-REQUISITE

BMIU 3764

BACHELOR DEGREE PROJECT I/ PROJECT SARJANA MUDA I

ELECTIVE BMIP

MOULD DESIGN/ REKA BENTUK ACUAN (BMID 4814)

LEARNING OUTCOMES

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

1. Classify requirements for a mould design and different types of moulds.
2. Design a mould layout and associate component.
3. Perform a runner and gating system selection for selected part

SYNOPSIS

This course is an introduction to the basic principles and method of designing mould components such as cavity, core, sprue, cooling system, gate and ejectors system. The students will be exposed to the application of industrialwork holding devices, drawing engineering standards, design catalogs and mold design handbooks.

REFERENCES

- Rainer Dangel (2016) Injection Moulds For Beginners, Hanser Publishers, Munich.
- Kazmer D.O. (2016). Injection Mold Design 2nd Edition, Hanser Publishers, Munich.
- Harry Pruner Wolfgang Nesch (2013). Understanding Injection Moulds, Hanser Publishers, Munich.
- Rees. H (2011). Mold Engineering 2nd, Hanser Publishers, Munich.
- Osswald. T.A., Turng L.S and Graman. P (2008) Injection Moulding Handbook, 2nd Edition Hanser Publishers, Munich

AUTOMOTIVE COMPONENT MANUFACTURING/ PEMBUATAN KOMPONEN AUTOMOTIF (BMID 4824)

LEARNING OUTCOMES

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

1. Explain the knowledge in automotive manufacturing technology.
2. Builds the automotive components at the final prototype stage by using software and machinery.
3. Apply the knowledge of design and material processing to produce automotive components for supporting the automotive ecosystem.

SYNOPSIS

This course provides strong fundamental concepts and techniques related to various type of finishing method that are applied in automotive industries. This course covers three major techniques used in finishing process such as machine process, joining process and surface treatment. The course is practically oriented where students apply their knowledge as well as capable to operate the relevant equipment.

REFERENCES

- Serope Kalpakjian, (2014) Manufacturing Engineering & Technology, 7th edition, Prentice Hall
- R.L. Timings, (1998) Manufacturing Technology, vol 1, 3rd edition, Wesley Longman
- P.N RAO, (2000) Manufacturing Technology-Metal cutting & Machine Tools, McGraw Hill.
- J.L.Stauffer, (1993) Finishing Systems design & Implementation, Published by association of Finishing
- process of the Society of Manufacturing Engineers. (SME).
- H.S .Bawa, (2004) Manufacturing processes, McGraw Hill.
- Robert. GmBH, (2005) Automotive Handbook, 6th edition. Society of Automotive Engineer (SAE)

LEAN MANUFACTURING/ PEMBUATAN LEAN (BMIP 3804)

LEARNING OUTCOMES

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

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

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 analyze manufacturing systems 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 case studies and industrial experience and will identify the benefits to be gained by their success.

REFERENCES

- William A. Levinson. (2013). Lean management system LMS: a framework for continual lean improvement. Boca Raton, FL: CRC Press
- William, M.F. (2000), Lean Manufacturing: Tools, Techniques, and How to Use Them, St. Lucie Press
- Tapping, D., Luyster,T. and Shuker, T (2002) Value Stream Management, Productivity Press.
- Womack, J. P. and Jones, D.T., (2003) Lean Thinking, Simon & Schuster.
- Shingo, S. (1989) A study of the Toyota Production System from an Industrial Engineering Viewpoint, Productivity Press

IOT IN MANUFACTURING/ IOT PEMBUATAN (BMIP 4834)

LEARNING OUTCOMES

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

1. Apply the knowledge of design and material processing to produce automotive components for supporting the automotive ecosystem.
2. Builds the automotive components at the final prototype stage by using software and machinery.
3. Shares the knowledge of automotive manufacturing new technology among students.

SYNOPSIS

This course provides strong fundamental concepts and techniques related to various type of finishing method that are applied in automotive industries. This course covers three major techniques used in finishing process such as machine process, joining process and surface treatment. The course is practically oriented where students apply their knowledge as well as capable of operating the relevantequipment.

REFERENCES

- Serope Kalpakjian, (2014) Manufacturing Engineering & Technology, 7th edition, Prentice Hall
- R.L. Timings, (1998) Manufacturing Technology, vol 1, 3rd edition, Wesley Longman
- P.N RAO, (2000) Manufacturing Technology-Metal cutting & Machine Tools, McGraw Hill.
- H.S .Bawa, (2004) Manufacturing processes, McGraw Hill
- Robert. GmBH, (2005) Automotive Handbook, 6th
- edition. Society of Automotive Engineer (SAE) McGraw Hill, 2005

MANUFACTURING SYSTEM/ SISTEM PEMBUATAN (BMIP 3814)

LEARNING OUTCOMES

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

1. Solve manufacturing system problems using simulation approach.
2. Construct models of discrete event simulation for various manufacturing systems
3. Demonstrate manufacturing system simulation using simulation software

SYNOPSIS

Modelling and simulation introduce the students to principles and techniques of discrete event simulation. This is a powerful system tool for analyzing a wide variety of complex engineering and business problems. Students will learn to model a real system, use the main computational and programming instruments, and simulation language, to program the model. Students also will be exposed to design and evaluate simulation experiments.

REFERENCES

- Harrington, H.J. and Kerim T. (2000) Simulation Modeling Methods: To Reduce Risks and Increasing Performance, McGraw Hill.
- Severance, F. L. (2001) System Modeling and Simulation: An Introduction, John Wiley & Sons.
- Averill, L. and Kelton, W.D., (1999) Simulation Modeling and Analysis (Industrial Engineering and
- Management Science Series), 3rd Edition, McGraw Hill Science/Engineering/Math.

COMPUTER PROGRAMMING/ PENGATURCARAAN KOMPUTER (BMIW 1343)

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 to computer architecture and software development. The course consists of basic programming principles such as introduction to C++ programming syntax, variables, data types, operators, selection, repetition, function, array, pointer, structures and file processing.

REFERENCES

- Abdul Kadir, (2016), C++ Programming A Practical Hands-on for Self-Learning, 1st Edition, Penerbit Universiti, Universiti Teknikal Malaysia Melaka.
- Gaddis, T., (2015), Starting Out with C++: From Control Structures through Objects, 8th Edition, Global Edition, Pearson Education.
- Daniel Liang, Y, (2014), Introduction to Programming with C++, 3rd Edition, Pearson Education.
- Deitel, H.D., (2014), C++ How to Program, 9th Edition, Pearson Education.
- Nell, D., (2013), Programming and Problem Solving with C++: Comprehensive, 6th Edition, Jones & Bartlett Learning.

ENGINEERING DRAWINGS & CAD/ LUKISAN KEJURUTERAAN & CAD (BMID 1303)

LEARNING OUTCOMES

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

1. Explain the principles of engineering drawing and Computer Aided Design (CAD)
2. Generate 2D and 3D freehand sketching.
3. Construct engineering drawing using CAD software

SYNOPSIS

The purpose of this course is to provide students with an understanding of the importance of engineering graphic communication to the design process and interpretingthe engineering drawings. Students will gain hands-on experience creating freehand technical sketches, CAD technical drawings using orthographic projections, sections auxiliary views and isometric drawings. Emphasis is placed on creating drawings that are neat, correctly dimensioned using industry standards. Students will use freehand sketches methods and CAD software to develop visualization skills and create engineering drawings. This course consists of lectures and practical session. A major part of the course consists of performing structured laboratory exercises. Classroom activities will complement and support the lab exercises with explanations and demonstrations of required activities.

REFERENCES

- Ashleigh Fuller, Antonio Ramirez, Douglas Smith. Technical Drawing 101 With Autocad 2017.
- David A. Madsen and David P. Madsen, Engineering Drawing And Design, 6th edition, 2016.
- Giesecke, Mitchell, Spencer, Hill, Dygdon, Novak,
- Technical Drawing With Engineering Graphics, 14th Edition, Prentice Hall, 2012.
- Dix Riley, Discovering Autocad 2009, Pentice Hall, 2009.

MANUFACTURING PROCESSES/ PROSES PEMBUATAN (BMIP 1323)

LEARNING OUTCOMES

At the end of this course, students 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.

SYNOPSIS

In this module, students will be introduced to various manufacturing processes that can be categorized intothree major focus areas: metal removal processes, near- net shape and forming processes and joining processes. For the metal removal processes, the students will be exposed to turning, milling and abrasive machining. In thearea 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.

REFERENCES

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

PRINCIPLE OF ELECTRICAL & ELECTRONIC/ PRINSIP ELEKTRIK & ELEKTRONIK (BMIW 1313)

LEARNING OUTCOMES

At the end of this course, 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 the topics of electrical and electronic components, emphasizing electric circuit theory such as components and measurement instruments, circuit analysis. For electronic principles, itwill cover the topics of electronic devices such as operational amplifiers and digital electronics it will deals with topics such as system numbers, logic gates, Booleanoperation, combination logic circuits, and digital circuit application.

REFERENCES

- Allan, R., H. (2014) Electrical Engineering, Pearson Education.
- Thomas L. Floyd (2010) Principles of Electric Circuits, 9th Edition, Prentice Hall.
- Thomas L. Floyd (209) Digital Fundamental, 10th Edition, Pearson Education.
- Alexander, C.K., (2008) Fundamental Of Electric Circuit, Mcgraw Hill.
- Nilsson, J. W., Riedel, S. A., (2008) Electric Circuit, Prentice Hall.
- Roger, T., (2008) Digital Electronics Principles & Applications, Mcgraw Hill.

STATICS/ STATIK (BMID 1313)

LEARNING OUTCOMES

At the end of this course, 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

- Hibbeler, R.C. (2016) Statics and Mechanics of Materials, 14th SI Edition, Prentice Hall, New York.
- Beer, F. P., Johnston jr., E. R., Eisenberg, E. R., (2016)
- Vector Mechanics for Engineers - Statics, 11th Edition in si units, McGraw Hill, New York.
- Meriam, J. L., Kraige L. G. (2008) Engineering
- Mechanics - Static SI Version, 6th Edition., John Wiley & Sons, New York.
- Pytel, Kiusaalas. (2009). Engineering Mechanics-Static. 3rd Ed. Cengage Learning.
- Michael P., Gary, G., Constanzo, F., (2009). Engineering Mechanics - Statics. Mcgraw-Hill Higher Education.

SOLID MECHANICS/MEKANIK PEPEJAL (BMID 2323)

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

Introduction to various types of structures and supports. Concepts of stress, strain, shear force and bending moment. Theory on beam deflection. Theory on torsion. Shear flow. Combination of loads. Deflection of beams

REFERENCES

- Hibbeler R.C., 2013, Statics and Mechanics of Materials, 3rd SI Ed., Prentice Hall, New York.
- Beer. F.P. Et Al. 2012. Mechanics Of Materials, 6th Edition in SI Units. Mcgraw-Hill.
- Beer. F.P. Et Al. 2011. Statics and Mechanics of Materials, 1st Edition. Mcgraw-Hill.
- 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.
- Roy Craig Jr., 2011, Mechanics of Materials, 3rd Ed., John Wiley & Sons, New York.

BMIP 1313 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 typeof 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

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

BMIW 1303 CAD / CAM & CNC TECH/ CAD / CAM & TEKNOLOGI CNC

LEARNING OUTCOMES

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

1. Explain CAD/CAM & CNC systems and applications in manufacturing industries.
2. Demonstrate basic principle CAD methodology from 2D sketching to 3D modeling, dress-up features and 3-Axis CAM operations.
3. Manipulate machining operations and toolpath methods for 3-Axis CAM machining for any given industrial part.

SYNOPSIS

This course is an introducing to the CAD/CAM & CNC fundamental system and its application in industry. The students will be exposed to the application of high-end CAD/CAM software for generating geometric modeling and CAM programming. The course covers from 2D sketching to 3D modeling with basics dress-up features as well as CAM Programming up to 3-Axis machining. Introductory to CNC basic universal coding system also being taught to expose the students about the relationship between CAD/ CAM and CNC.

REFERENCES

- J. Srivinas (2016), CAD/CAM: Principles and Applications, Oxford University Press, India.
- Michael Michaud (2012), CATIA Core Tools: Computer Aided Three-Dimensional Interactive Application, 1st Edition, McGraw-Hill Education.
- P N Rao (2010) CAD/CAM: Principles and Applications, 3rd Edition, Tata McGraw Hill Education Private Limited.
- Alan Overby, (2011) CNC Machining Handbook, the McGraw-Hill Companies.
- Michael Fitzpatrick, (2013) Machining and CNC
- Technology, 3rd Revised Ed, McGraw-Hill Higher Education.
- Nader G Zamani (2017), CAD Modeling Essentials in 3DEXPERIENCE 2016x Using CATIA Applications,
- SDC Publications.
- Nanang Ali Sutisna (2019), CATIA V5 CAD CAM Exercise Manual, Lambert Academy Publication.

THERMOFLUID/ TERMO BENDALIR (BMID 2313)

LEARNING OUTCOMES

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

1. Apply the thermodynamics First Law and Second law for common steady-flow device.
2. Solve various fluid flow problems using the Bernoulli Equation
3. Demonstrate the principles of thermodynamics and fluid mechanics through laboratory experiments

SYNOPSIS

The course introduces the students to the basic engineering of thermodynamics that involved study on the energy transformation, working fluids, theory and application of first and second laws of thermodynamics. The course also covers explanation on the steam and gas power plant as a direct application of the thermodynamic theory. Students will be exposed on refrigeration system as an application on the thermodynamics principles. The second part of this course is to introduce the students to the basic of fluid mechanics. This consists of fluid's static and dynamic analysis, buoyancy and stability, Bernoulli equation, momentum principle, flow behavior in pipe and also covers the basic principle of dimensional analysis.

REFERENCES

- Cengel, Y.A., Turner, R. H. & Cimbala, J. M. (2012) Fundamentals of Thermal-Fluid Sciences, 4rd Edition in SI Units, Mc Graw Hill.
- Kaminsky, D. A. & Jensen, M.K. (2005) Introduction to Thermal and Fluid Engineering, John Wiley & Sons, Inc.
- Cengel, Y.A. & Michael, A.B. (2002) Thermodynamics: An Engineering Approach, 4th Edition, Mc Graw Hill.
- Eastop, T.D. & McConkey, A. (2004) Applied Thermodynamics for Engineering Technologist, 5th Edition, Longman.

QUALITY CONTROL/ KAWALAN KUALITI (BMIP 2333)

LEARNING OUTCOMES

1. At the end of this course, student should be able to:
2. Explain the basic quality principles and practices, quality solving techniques and product reliability related to manufacturing process.
3. Solve the manufacturing process quality problem using quality solving techniques.
4. Perform the ability to apply the quality solving techniques such as SPC, QFD, FMEA and Six Sigma in order to improve quality.

SYNOPSIS

There are four main sections consist in Quality and Reliability course: quality principles and practices; quality solving techniques; reliability and additional quality tools. In quality principle and practices, its covers quality basic, quality gurus, introduction to total quality management, and quality awards. Quality solving techniques will cover statistical process control (7 QC tools). In reliability, it explains life and reliability testing plans for product and process. Additional quality tools are Quality Function Deployment (QFD), Failure Mode Effect & Analysis (FMEA), Six Sigma and PDSA.

REFERENCES

- Montgomery D. C., (2009) Introduction to Statistical Quality Control, 6th Edition, John Wiley and Sons, Inc.
- Besterfield, D. H. (2014) Quality Improvement, 9th Edition, Pearson.
- Bass, I (2014) Six Sigma Statisctic with Excel and Minitab, Mc Graw Hill.
- Besterfield, D.H., Besterfield-Minhna, C., Besterfield,
- G. H. and Besterfield-Sacre, M. (2011) Total Quality Management, 3rd Edition, Prentice Hall.
- Yusuf, Y., Abdullah, R. And Abdul Rasib, A. H. (2019) Quality Control For Engineering Technologist, 2nd Edition.

INDUSTRIAL ROBOTIC & AUTOMATION/ ROBOTIK DAN AUTOMASI INDUSTRI (BMIW 2313)

LEARNING OUTCOMES

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

1. Explain concepts, principles and technologies related to robots and components of automation applied in manufacturing industry.
2. Solve problems related to the applications of robots and automation in manufacturing related activities.
3. Design automation systems or components using tools such as programmable logic controllers, drives systems, and industrial robots.

SYNOPSIS

The aim of this module is to provide knowledge on technology applied in industrial robotics and automation systems and components with focus on manufacturing. The first part of the module focus on elements of automation with emphasize on topics such as sensors, actuators, control and material handling. The second part of the module centers on robots' technology covering topics on robots' anatomy, robots' manipulators, transformation matrices, forward and inverse kinematics, and trajectory planning. Students are then equipped with skills on PLC automation programming, robots' motions, and simulation of automatic assembly process.

REFERENCES

- Groover M. P., (2016) Automation, Production Systems, and Computer integrated Manufacturing,4th Edition, Pearson.
- Saeed, N, (2011) Introduction to Robotics – Analysis, Control, Applications, John Wiley and Sons.
- Craig, J.J, (2017) Introduction to Robotics – Mechanics and Control, 3rd Edition, Pearson.

DATA MANAGEMENT & PROCESS OPTIMIZATION/ PENGURUSAN DATA DAN PENGOPTIMUMAN PROSES (BMIW 2323)

LEARNING OUTCOMES

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

1. Explain model of manufacturing problems in linear programming, decision theory, transportation models, network models and waiting Lines.
2. Determine the alternative solutions in optimization problems.
3. Construct the solutions of optimization in manufacturing systems.

SYNOPSIS

Analyse, interpret and evaluate data. The goal of data analysis is to support the organization in decision-making. Optimization in manufacturing industry involves trying to make the most effective use of an organization's resources. Resources in organization such as machinery, money, energy, labor force are elements to make products. Linear programming is one of the tools, which is widely used, based mathematical technique to help plan and make decisions necessary to allocate resources. This course covers principles and practices, tools and techniques, fundamentals of data analysis and optimization problem in manufacturing. It discusses mathematical formulation of production or operational problems and solve them using linear programming and other optimization techniques. This course consists of two parts: data management and process optimisation.

REFERENCES

- Montgomery, D. C. & Runger, G. C. (2020). Applied statistics and probability for engineers (7th ed.). John Wiley & Sons.
- S. Christian Albright, Wayne L. Winston, Christopher J. Zappe (2019) Data Analysis and Decision Making, Seventh Edition, South-Western, Cengage Learning.
- Ignizio J.P., Linear Programming in Single & Multiple Objective Systems, Prentice Hall 2009.

DYNAMICS & MECHANICS OF MACHINE/ DINAMIK & MEKANIK MESIN (BMID 2333)

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. Demonstrates 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 dibbles. 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 reciprocating motionas 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 consist of moving one degree of freedom. Free vibration. Damped free vibration. Forced damped vibration. Speed control of the cycle flywheel

REFERENCES

- Beer, F. P., Johnson, E.R., Clausen, W. E., (2013) Vector Mechanics For Engineers, Dynamics Si Units, 10th Edition. McGraw-Hill.
- Hibbeler, R. C. (2013) Engineering Mechanics, Dynamics, 12th Edition. Prentice Hall.
- Meriam, J. L. And Kraige, L. G. (2013). Engineering Mechanics, SI Version, 6th Edition. John Wiley.
- Bedford, A. And Fowler, W. (2008). Engineering Mechanics: Dynamics (SI units). 5th Edition. Prentice Hall.
- Cleghorn, W. L., 2005, Mechanics of Machines, Oxford University Press.

ADDITIVE MANUFACTURING/ PEMBUATAN TAMBAHAN (BMIW 2333)

LEARNING OUTCOMES

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

1. Explain the fundamental of additive manufacturing (AM) and understand why it has become one of the most important technology trends in decades for product development and innovation.
2. Demonstrate comprehensive knowledge of the broad range of AM processes, devices, capabilities and materials that are available.
3. Develop physical object from CAD using additive manufacturing.

SYNOPSIS

In this course student will learn the importance of additive manufacturing (AM) and its impact on global product development. Initially, historical development of AM will be discussed together with other related technologies. Then, student will be able to explore the potential of AM technologies, devices, capabilities, materials and applications. Major AMprocesses which can be classified as solid based, liquid based and powder based will be discussed in detail. Later, the trade-offs between these various AM processes will be compared. This course will also explore the broad range ofAM applications, including aerospace, consumer products, creative artistry and others.

REFERENCES

- Chee Kai Chua, Kah Fai Leong, 3D Printing and Additive Manufacturing: Principles and Applications, 5th Edition, World Scientific, 2016.
- Gebhardt A., Understanding Additive Manufacturing, Hanser Publisher, 2014.
- Thompson, R, Prototyping And Low Volume Production: The Manufacturing Guides, 2011.
- Gibson, I., Rosen, D.W. and Stucker, B., Additive
- Manufacturing Technologies, Springer, 2010.
- Noorani, R., 3D Printing: Technology, Applications And Selection, 4th Edi., CRC Press, 2018.
- Redwood, B., Schoffer, F. and Garret, B., The 3D Printing Handbook: Technologies, Design And Applications, 3D Hubs B.V.,2018.

PRODUCT DESIGN & MANUFACTURING/ REKA BENTUK PRODUK & PEMBUATAN (BMIW 2343)

LEARNING OUTCOMES

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

1. Describe the design principles and ease of manufacturing
2. Organize the product through the outcomes of analysed problems.
3. Ability to work effectively in group for process of product design and development.

SYNOPSIS

Product Design and Manufacturing unify the perspectives of marketing, design and manufacturing into a single approach to product development. Students will be exposed to the concepts and principles of product design as well as the best processes to manufacture the product. As a result, this course provides the studentswith an appreciation for the realities of industrial practice and for the complex and essential roles played by various members of product development teams. Throughout this course, attempts are made to strike a balance between theory and practical.

REFERENCES

- Boothroyd, Geoffrey & Dewhurst, Peter & Knight,W.A., (2020). Product design for Manufacturability and assembly.
- Ulrich K. T., Eppinger S. D. (2016), product design and development, 6th edition, McGraw Hill Irwin.
- Kalpakjian S., Steven R., Schmid, (2014) manufacturing engineering & technology, 7th edition, Prentice Hall.
- Anderson, D.M., (2014). Design for Manufacturability: how to use concurrent engineering to rapidly develop low-cost, high-quality products for lean production.
- Chitale A. K. and Gupta R. C. (2013), product design and manufacture, 6th prentice hall, new Delhi, India.

CAD/CAE (BMID 3583)

LEARNING OUTCOMES

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

1. Explain the basic principles of finite element analysis in industrial practices.
2. Apply finite element modeling and equation to solve mechanical structure and fluid flow problem in design.
3. Demonstrate finite element analysis using CAD/CAE software.

SYNOPSIS

The course will introduce the students to the fundamental concepts of the finite element method and analysis in the context of practical application with emphasis on the engineering issues

REFERENCES

- Chandrupatla T.R and Belgundu, A.D (1997), Introduction to the Finite Elements in Engineering, 2nd Edition, Prentice Hall, New Jersey.
- Huebner K.H and Dewhirst D.L(2001), The finite Element Method for Engineers, 4th Edition, John Wiley and Sons Inc, Toronto Canada.
- Cook R.D (1995), Finite Element Modeling for Stress Analysis, John Wiley and Son Inc.
- Logan D.L (2002), A First Course in the Finite Element Method, 3rd Edition Brooks/Cole, Pacific Grove, CA.

APPLIED INDUSTRIAL ENGINEERING/ KEJURUTERAAN INDUSTRI GUNAAN (BMIW 3113)

LEARNING OUTCOMES

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

1. Analyze problems that are related to Industrial Engineering.
2. Solve manufacturing operation scenarios using Industrial Engineering tools and techniques.
3. Conduct experiments or laboratory tasks related to topics discussed in IE.

SYNOPSIS

This is a 3-credit hour course offered to all third-year students of the Department of Manufacturing Engineering, Faculty of Engineering Technology. Students will be introduced to the concept of productivity and the various Industrial Engineering (IE) tools and techniques toimprove productivity. Thus, during the first part of the course, emphasis will be on constructing activities onForecasting, Work System Design, Strategic Capacity Planning, and Facility Layout to attain efficiency and effectiveness in manufacturing operations. In the second part, teaching and learning activities relatedto Material Requirement Planning, Inventory Control, Production Scheduling and Simulation Modeling. Lastly, the topic of Lean Manufacturing will also be included to introduce to the students on the recent focus by many companies to eliminate wastes in the operations.

REFERENCES

- Tephen & Chapman, JR Tony Arnold, Ann K Gatewood, Lloyd M Clive (2017). *Introduction to materials management*, 8th edition, Pearson Education Limited.
- Sushil Gupta, Martin star (2014). *Production and operations management systems*, CRC Press.
- Stevenson, W.J., Chuong, S.C (2010). *Operations management: an Asian perspective*, 11th Edition McGraw Hill
- Garcia-Diaz, Alberto and smith, J. Macgregor (2008). *Facilities planning & design*. Prentice hall, 2008.
- Arnold, J.R. Tony, chapman, Stephen N. and Clive, Lloyd M. (2012). *Introduction to Materials Management*. Pearson International.

SOLID MODELLING/ PEMODELAN PEPEJAL (BMIW 1213)

LEARNING OUTCOMES

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

1. Explain the basic concepts of 3D modeling and its application in design process.
2. Construct assembly design.
3. Design and simulation using advance CAD tool

SYNOPSIS

This course is an advancement and continuation of engineering drawing and cad, whereby the students will broaden their basic knowledge in 3d parametric modelling application. The aim of this course is to provide students with an understanding of advance 3-dimensional modelling. Emphasis is on 3d modelling generation skills which can be simulated at early stages of the design process. Classroom activities will complement and will be supported by lab exercises with explanations and demonstration of related activities. .

REFERENCES

- David C. Planchard, Engineering Design With Solidworks 2024, Sdc. .
- James D. Bethune, Engineering Design And Graphics With Solidworks 2019, Peachpit Press.
- Randy H. Shih, Solidworks 2021 And Engineering Graphics: An Integrated Approach, Sdc.
- Introduction To Solid Modeling Using Solidworks 2024 /William H. Howard, Joseph C. Musto
- Nam H. Kim, Bhavani V. Sankar, Ashok V. Kumar (2018) Introduction To Finite Element Analysis And Design, 2nd Edition, John Wiley And Sons Inc., Toronto Canada.

ERGONOMICS DESIGN/ REKA BENTUK ERGONOMIK (BMID 3553)

LEARNING OUTCOMES

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

1. Apply ergonomics principles to create safe, healthy, efficient and effective activities in the workplace.
2. Analyze the effectiveness of the work system designed.
3. Constructs a design of work system by taken into consideration human capabilities and limitations.

SYNOPSIS

This course provides the students with the rationale for providing an occupationally safe and healthy work environment in industry. Three main elements of this course: human, equipment and work environment. These three elements are classified into different areas, however correlations of them are discussed and exemplified in each topic. Through human study, students will be explained about the human anthropometric, physiology, psychology as well as capabilities and limitations of human. Meanwhile, through ergonomic design of equipment, students will learn on how to design the hand tools and workstations that are safe to the users. Last but not least, the students also will be exposed on how to manage work environment such as thermal comfort, noise, etc. This will contribute better understanding to occupational health of industries.

REFERENCES

- Karl H.E. Kroemer. Introduction to Ergonomics/ Human Factors Engineering, 7th Edition. 2017.
- Karwowski, W., (Editor), Applying Systemic- Structural Activity Theory to Design of Human- Computer Interaction Systems. Taylor & Francis, London, 2015.
- MCCauley Bush, Pamela, Ergonomics Foundational
- Principles, Applications, and Technologies, Boca Raton, FLCRC Press, 2012.
- Wickens, C.D., An Introduction to Human Factors Engineering, 2 nd Edition, Pearson Education International, 2013.

SUPPLY CHAIN MANAGEMENT/ PENGURUSAN RANTAIAN BEKALAN (BMIW 3133)

LEARNING OUTCOMES

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

1. Describe the strategic importance of supply chain design, planning and operations.
2. Identify supply chain performance drivers and understand how they align with the functions in a company to improve competitive advantage.
3. Analyze supply chain management and design problems and apply relevant analytical tools to develop solutions.

SYNOPSIS

Supply chain management (SCM) deals with the management of materials, information, and financial flows in networks consisting of suppliers, manufacturers, distributors, end users and customers. Successful supply chains require decision making in the design, planning and operational phases. Facilities, inventory, transportation, sourcing, pricing and information are identified as key drivers for supply chain performance. This course provides a strategic framework to understand the importanceof each of these drivers to ensure the successful implementation of the three phases. This course focuses on the inter-relationship of the strategic role of the supply chain and key drivers of supply chain performance. The course also provides exposure to use of primary analytical methodologies to solve supply chain problems.

REFERENCES

- Chopra, S. & Meindl, P., 2013, Supply Chain Management. Strategy, Planning and Operations (6th edition), Pearson (Course textbook)
- Simchi-Levi, D., Kaminsky, P. & Simchi-Levi, E., 2009, Designing and Managing the Supply Chain, (3e), McGraw-Hill.
- Bowersox, D.J., Closs, D.J. & Cooper, M.B., 2010, Supply Chain Logistic Management (3e). McGrawHill.
- Ballou, R., 2003, Business Logistics Management, 5th Edition, Prentice Hall.
- Chase, R & Jacobs, R., 2011, Operations and Supply Chain Management (13th edition). McGraw Hill.

STRUCTURAL COMPONENTS OF AIRCRAFT/ STRUKTUR KOMPONEN KAPAL TERBANG (BMIW 3803)

LEARNING OUTCOMES

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

1. Describe the basic principles of aircraft structure.
2. Appreciate the roles that structures, and structural materials play in aerospace vehicles.
3. Gain experience identifying, formulating, and solving aero structure problems.

SYNOPSIS

This course focuses on aircraft structure concepts. Students will be familiarized to the importance of customerrequirements and airworthiness certification for aircraftstructural development. Aircraft loads and major material for aircraft will be presented as significant factors for structural design. Various simple tools for supporting theanalysis of structural integrity of the aircraft components will be introduced, including simple structural analysis of fuselage, wings, tail, landing gear and engine.

REFERENCES

- Saha, Pradip K. (2017) Aerospace Manufacturing Processes, Taylor & Francis Group, Boca Raton.
- Soler, Manuel. (2014), Fundamentals of Aerospace Engineering, 1st Edition, Create Space, New Jersey.
- Megson, T. (2007). Aircraft structures for engineering students, A Butterworth Heinemann Title.

JIGS & FIXTURES FOR AEROSPACE/ JIG DAN LENGKAPAN UNTUK AEROANGKASA (BMIW 3813)

LEARNING OUTCOMES

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

1. Describe the basic principles of jig and fixture for aerospace manufacturing.
2. Identify the process engaged in fabricating the jig and fixture for aerospace.
3. Apply the principles of manufacturing the jig and fixture for aerospace.

SYNOPSIS

This subject consists of the design for manufacturing, principles of producibility design, tools and manufacturing of jigs and fixtures, jigs and fixtures for aerospace manufacturing, construction methods and materials of jigsand fixtures and types of jigs and fixtures.

REFERENCES

- Hoffman, E.G. (2004) Jig and Fixture Design 5thedition, Thomson Delmar Learning Publisher,Florence.
- Henriksen, E.K. (1973), Jig and Fixture Design Manual, Industrial Press, New York.

INDUSTRIAL DESIGN/ REKABENTUK INDUSTRI (BMIW 3823)

LEARNING OUTCOMES

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

1. Explain systematic approach of basic design process.
2. Apply design and creative skills in to overcome design problems.
3. Demonstrate proficiency in sketching and basic model-making techniques using various materials.

SYNOPSIS

Industrial design is the professional service of creating and developing concepts and specifications that optimize the function, value, and appearance of products and systems for the mutual benefit of both user and manufacturer. It covers relationships among the users of the designed item through aesthetics and 'form follow function' criteria. Whereas the manufacturer, it supports the ability of design towards mass manufacturability. Consumer appliances, tools, safety equipment, business machines, furniture, medical equipment, architectural products, and transportation devices make up a partial list of those areas of specialization in industrial design.

REFERENCES

- Marzuki Ibrahim. (2013). Rekabentuk Produk, Dewan Bahasa dan Pustaka
- Hassan. A, Ahmad Rizal. A.R. (2008). Rekabentuk Perindustrian, Dewan Bahasa dan Pustaka.
- Idris I., Richard L. B. K. (2007) Introduction to Basic Sketching and Rendering Techniques, UTM, Johor. http://www.education.edean.org/ (Retrieved on Feb. 2017)
- http://www.dsource.in/course/product-drawing/index.html (Retrieved on Feb. 2014)
- Cuffaro, D., & Zaksenberg, I. (2013). The Industrial Design Reference & Specification Book: Everything Industrial Designers Need to Know Every Day. Massachusets: Rockport.

VISUAL COMMUNICATION/ KOMUNIKASI VISUAL (BMIW 3833)

LEARNING OUTCOMES

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

1. Able to use graphical software in various media to suit design purposes.
2. Apply design theory to create visual communications.
3. Develop a capacity to undertake ongoing design thinking while conceiving, communicating and presenting ideas

SYNOPSIS

The course will teach the student to understand Visual Communication theory. Students will master suitable graphical software for computer visualization and printing techniques. Students will be shown how to present design media at a professional level in an industrial situation. Students will also develop further understanding and application of the principles of design visualization and presentation. Students will learn to apply the theory in Digital Photography, video production, branding, web development, posters and printing design.

REFERENCES

- Meredith Davis, Jamer Hunt, (2017), Visual Communication Design, Bloomsbury academic.
- Guan Ming Soo et.al, (2013) 3D Visual Communication, Wiley.
- Maura Keller, Michelle Taute, (2012) Design Matters, Rockport Publishers.
- Ken Smith et.al, (2011) Handbook of Visual Communication, Taylor and Francis Group.

DATA STRUCTURE & ALGORITHM/STRUKTUR DATA & ALGORITMA (BMIW 3843)

LEARNING OUTCOMES
At the end of this course, student should be able to:
1. Illustrate the fundamental of data structures and algorithms including basic algorithm analysis.
2. Construct programs which implement various data structures
   and common searching and sorting algorithms.
3. Demonstrate the implementation of data structures and algorithms in problem solving.

SYNOPSIS
This course aims to develop students' knowledge in data structures and algorithms. Students will be introducedto abstract data type (ADT) concept and later apply the ADT concept in the implementation of data structures. Additionally, analysis of algorithm efficiency will be explained followed by discussion on various common searching and sorting algorithms. Students will then learn essential data structures like linked list, stack, queue, tree, graph and heap along with the operations for maintaining them. Throughout the semester, students will also beexposed on applying those various data structures in solving various challenges and problems.

REFERENCES

- Malik, D. S., "C++ Programming: Program DesignIncluding Data Structures", 8th edition, Cengage Learning, 2018.
- Drozdek, A., "Data Structures and Algorithms in C++ 4th
- Edition", Cengage Learning, 2013.
- Malik, D. S., "Data Structures Using C++", 2nd edition,Cengage Learning, 2010.
- Y.Daniel Liang, "Introduction to Programming with C++",3rd
- Edition, Pearson, 2014.
- Mark A. Weiss, "Data Structures and Algorithm Analysis in
- C++",4th edition, Pearson, 2014.

PRE-REQUISITE
Basic understanding of C programming language, text editor, and execution of programs.

DIGITAL FACTORY & SIMULATION/ PERKILANGAN DIGITAL & SIMULASI (BMIW 3853)

LEARNING OUTCOMES
At the end of this course, student should be able to:
1. Explain the principles of digital factories and their relation to real factories by giving examples of digital verification and industrial relevance.
2. Demonstrate how a digital factory can be developed inmodelling and simulation software for manufacturing concepts, factory layouts, production planning and manufacturing flow.
3. Model, simulate and analyze manufacturing systems with simulation technology.

SYNOPSIS
With the very high cost of investment in manufacturing industry, it is very important that good decisions are madeabout buying and operating manufacturing systems. Atthe same time the increasing complexity of manufacturingsystems makes decision making more difficult. Simulation is often the only way to gather the necessary information. Besides, the ability to rapidly prepare and rebuild a factory for the manufacturing of new products has become an increasingly important issue. One wayof speeding up such a change process is to model and simulate the manufacturing and the flow of products inthe factory-to-be, even before the start of its construction. This course deals with models and software that can be used in such a simulation process, with a particular focus on the need for and benefit of standardized models. The teaching module deals with the simulation as a method to analyze and evaluate the operation or designof manufacturing processes and facilities. Students shall be enabled to efficiently use the discrete event simulation and graphical dynamic simulation technique. Complexity is managed by analyzing only relevantdecision criteria.

The module contains of - Theory of discrete event simulation - Process oriented and object oriented modelling techniques - Training in the simulation package - Steps to conduct simulation studies and projects - Classification of simulation packages - Project based on real production industrial situation - Statistical analysis of simulation models - Newest developments in the field of simulation, distributed simulation, web-based simulation.

REFERENCES

- Banks, J., Carson II, J.S., Nelson, B.L, Nicol, D.M. (2014). Discrete-Event System Simulation. Fifth Edition. Pearson Education Limited. Essex. England.
- Fabre, R., Bensoussan, A., Colin, Lucille., Blanquart, M.(2018). The Digital Factory for Knowledge: Production and Validation of Scientific Results. Wiley-ISTE.
- Murray, N.G. (2017). Rational Process Design and Simulation Modeling with Lanner Witness Horizon. DEMS.

BACHELOR DEGREE PROJECT I/PROJEK SARJANA MUDA I (BMIU 3764)

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

This is the first part of the Bachelor Degree Project (BDP Students are expected to prepare a BDP proposaland conduct preliminary investigation. At the end of the semester students are required to submit the Bachelor Degree Project Proposal and preliminary findings for assessment and defend it through Presentation and Q&A session.

REFERENCES

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

BACHELOR DEGREE PROJECT II/PROJEK SARJANA MUDA II (BMIU 4774)

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 (BDP 2). Students are expected to continue the project started in BDP 1 until completion. At the end of the semester students are required to submit the Bachelor Degree Project Thesis and a FOUR PAGES Summary related to the thesis for assessment and defend them through Presentation and Q&A session.

REFERENCES

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

PRE-REQUISITE

BMIU 3764

BACHELOR DEGREE PROJECT I/PROJECT SARJANA MUDA I

ENGINEERING FINANCIAL AND PROJECT MANAGEMENT/ KEWANGAN KEJURUTERAAN DAN PENGURUSAN PROJEK (BMIW 4113)

LEARNING OUTCOME

1. Describe the role of engineering financial, costing and economics in making financial decision.
2. Apply the concepts, principle and techniques in engineering financial, costing and economics.
3. Analyze cost effectiveness for making decision of alternative investment using, rate of return, single and multiple alternatives, benefit cost ration and project risk in engineering design project.

SYNOPSIS

The course covers engineering financial, cost andfinance 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 understandthe financial sensitivity of project decisions and the useof decision tools for integrating business requirements. Besides, cost management, which consists of production cost relationships, elements of the production process, managerial and cost accounting, inventory management, cost estimating methodology and cost control alternatives will be discussed in detail in this course. Apart from that, engineering economics will discuss 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 alternatives. 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 alternatives. The evaluation allows management to determine the probability of success of failure of the project.

REFERENCES

- Blank, L. and Tarquin, A. Engineering Economy, 8th Edition, McGraw Hill, 2017.
- W.G Sullivan, E.M Wicks, C.P. Koelling “Engineering Economy”. Prentice Hall International 17th Ed., 2018.
- Clifford F. Gray and Erik W. Larson, 2018, Project Management: The Managerial Process, 7th Edition, Mc Graw Hill.

ADVANCED MANUFACTURING PROCESSES/ PROSES PEMBUATAN TERMAJU (BMIP 3533)

LEARNING OUTCOMES

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

1. Selects the most appropriate processes for a given product design, application and cost.
2. Conducts some experiments based on the advanced manufacturing process lab sheet requirements.
3. Demonstrates correct steps in executing tasks/ projects related to advanced manufacturing process.

SYNOPSIS

The course consists of non-traditional manufacturing processes and material removal methods, which include manufacturing processes using lasers technology, electron beam, abrasive water jet, electro discharge machiningand electro chemical machining. Moreover, it will alsoinclude the introduction to aerospace material machining, automotive stamping, coating technology and electronic manufacturing processes.

REFERENCES

- Serope Kalpakjian & Steve Schmid, (2014) Manufacturing Process and Technology, Prentice Hall
- Mikell, P.G. (2007) Fundamental of Modern Manufacturing Process, 3rd Edition, Prentice hall.
- Gregg, R. (2004) Modern Materials and Manufacturing Processes, Prentice Hall.
- Degarmo, B.K. (1997) Materials and Processes in Manufacturing, 8th Edition, Prentice hall.

VISUAL DESIGN & MANUFACTURING/ PEMBUATAN & REKA BENTUK VISUAL (BMIW 3223)

LEARNING OUTCOMES

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

1. Demonstrates understanding of the theory, principles, concepts and vocabulary of 3D Computer Graphics.
2. Demonstrates understanding on important issues in the use of 3D digital visualization towards environmental communication and design.
3. Integrate the use of 3D digital visualization into a scientific or design inquiry.

SYNOPSIS

This course introduces students to the theory, concepts, principles and techniques of 3D Computer Graphics, including modeling, texturing, lighting, rendering and animation which is essential in visual manufacturing. It will also provide the student with understanding and the ability to animate 3D models.

REFERENCES

- The Art of 3D Computer Animation and Imaging, Kerlow, Isaac Victor, John Wiley & Sons, Inc., New York, New York., 3rd Edition / 2003, 0-471-43036-6.
- Shroeder, Martin & Lorenson, 'The Visualization Toolkit', 2nd ed., Prentice Hall, 1998. (or 3rd Edition).
- Kitware Inc. Edited by W.J. Shroeder, 'The Visualisation Toolkit User's Guide', Prentice Hall.
- Spence 'Information Visualization', Addison-Wesley, 2001. Good for the topic of information visualisation.
- Waguespack, C. (2013). Mastering Autodesk Inventor 2014 and Autodesk Inventor LT 2014: Autodesk Official Press. John Wiley & Sons.
- Ayachit, U. (2015). The paraview guide: a parallel visualization application. Kitware, Inc.

INDUSTRIAL INTERNET OF THINGS/ INDUSTRI INTERNET OF THINGS (BMIW 3383)

LEARNING OUTCOMES

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

1. Understand the basic principle and technique of Internet of Things.
2. Identify components in IoT architecture.
3. Apply the principle and technique of Internet of Things to real application.

SYNOPSIS

Internet of Things (IoT) aims to connect all important devices with people. The connected devices are purpose-built to improve human capability in decision-making and boost usage performance. Devices can range from connected coffee makers, cars, or sensors on cattle to connected machines in a production plant. These devices provide data that offers new insights, and as they talk to each other, they develop their own intelligence and can advise people about optimal ways to put them to use. This will revolutionize people habits and the way we do work. This course aims to provide a general overview of implementing IoT especially in manufacturing domain. It emphases on practical issues and application of IoT on manufacturing challenges. The main focus will be placed on designing the IoT in manufacturing use cases using IoT hardware and software toward intelligent action. Topics of discussion include: introduction to IoT technology; IoT architecture; sensors and actuator in IoT; communication technology for IoT; IoT-enabled manufacturing system; smart and intelligent IoT.

REFERENCES

- Hwaiyu Geng. Internet of Things and Data Analytic Handbook. John Wiley and Sons, 2017.
- Rajkumar Buyya and Amir Vahid Dastjerdi. Internet of Things: Principles and Paradigms. Elservier, 2016.
- Timothy Chou. Precision: Principles, Practices and Solutions for the Internet of Things. Cloudbook Inc, 2016.
- Andrian McEwen and Hakim Cassimally. Designing the Internet of Things. John Wiley and Sons, 2014.
- Cuno Pfister. Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud (Make: Projects). O'Reilly Media, 2011.

INDUSTRIAL TRAINING/ LATIHAN INDUSTRI (BMIU 47812)

LEARNING OUTCOME

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

1. Demonstrate technical competencies and skills gained throughout their internship .
2. Prepare a report on the industrial field daily activities in the logbook systematically.
3. Work effectively with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.
5. Produce industrial training report.
6. 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.

REFERENCES

- UTeM Guideline Handbook for Industrial Training.

SUSTAINABLE DEVELOPMENT/ PEMBANGUNAN LESTARI (BMID 4013)

LEARNING OUTCOMES

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

1. Explain the interrelationship between resource supply and sustainability in economic, environmental, and social contexts, using examples from current sustainability challenges.
2. Create sustainable product designs that minimize environmental impact while addressing real-world sustainability challenges through appropriate tools, ethical and professional practices.
3. Analysing the environmental impacts of products throughout their life cycle and making design choices in support of the United Nations Sustainable Development Goals particularly SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action)

SYNOPSIS

Sustainable or green product design integrates environmental, social, and economic considerations into the product development process to support the goals of sustainable development. This approach aims to minimize environmental impact using renewable resources, reduction of waste and emissions, and responsible material selection. It also promotes design practices that improve human well-being while protecting ecosystems, aligning with global sustainability objectives such as those outlined in the United Nations Sustainable Development Goals (SDGs), particularly SDG 9, SDG 12, and SDG 13.

REFERENCES

- Adisa Azapagic, Slobodan Perdan, Sustainable Development in Practice. Wiley - Blackwell, 2011
- David T.Allen, david R.Shonnard, Sustainable Engineering: Concepts, Design and Case studies, Prentice Hall 2012
- J. Paulo Davim, Sustainable Manufacturing , John Wiley and Sons, Inc., 2010
- M K Ghosh Roy, Sustainable Development: environment , energy and water resources, Ane Books Pvt. LLtd,2011
- Frederic P Miller, Agnes F Vandome, John McBrewster, Design for Environment, VDM Publishing House Ltd., 2010
- Michael F. Ashby, Materials and Sustainable Development, Butterworth- Heinemann Publishing, Elsevier Ltd. 2016
- Jonathan Chapman, Routledge Handbook of Sustainable Product Design, Taylor & Francis, 2019

ELECTIVE BMIW

AEROSPACE MEASUREMENT & INSPECTION/ PENGUKURAN & PEMERIKSAAN UNTUK AEROANGKASA (BMIW 3873)

LEARNING OUTCOMES

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

1. Describe the basic principles of measurement and inspection methods.
2. Select and propose suitable measurement techniques based on the analysis on engineering problems that fulfil the standard practice.
3. Evaluate the strength and limitations of NDT techniques and clearly recognize the parameters affecting the sensitivity and reliability of the NDT techniques.

SYNOPSIS

Precision and safety is important factor in Aircraft industry. This course will focus on the measurement and inspection in the manufacturing of aircraft part. Students will be introduced to the generalities of measurement, manual and computer assisted measurement of part dimension using conventional as well as using laser tracker. Destructive and Non-Destructive Testing (NDT) will also be familiarized including dye penetrant, Eddy current and Ultrasonic techniques.

REFERENCES

- Saha, Pradip K.. (2017) Aerospace Manufacturing Processes, Taylor & Francis Group, Boca Raton.
- Beckwith, T.G., Marangoni, R.D. and Lienhard V,J.H., (2007), Mechanical Measurement, 6th Edition,
- Prentice Hall.
- Mix, P.E., 1987, Introduction to Nondestructive Testing: A Training Guide, 2nd Edition, John Wiley, New York.

PRODUCT ARCHITECHTURE & USERABILITY TESTING/ SENIBINA PRODUK & UJIAN KEBOLEHGUNAAN (BMIW 3883)

LEARNING OUTCOMES

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

1. Explain the principles and functions of advanced industrial design product architecture.
2. Demonstrate proficiency in creating prototypes using various materials.
3. Apply usability testing principles in industrial design processes

SYNOPSIS

This course consisted of theoretical and practical components. The students will be introduced to advanced industrial design product architecture elements including its components, processes, and approaches. In addition, the students will be exposed to practical and hands-on design activities in developing product prototypes and evaluations through team collaborations. Students will also be exposed to product validation through usability testing.

REFERENCES

- Hassan Alli dan Ahmad Rizal, A.R., (2008), Reka Bentuk PerIndustrian – Pengenalan, Dewan Bahasa dan Pustaka, K.L.
- Marzuki Ibrahim. Rekabentuk Produk, Dewan Bahasa dan Pustaka, 2013
- K.T Ulrich, S.D Eppinger, Product Design and Development, 5th Edition, McGraw Hill, 2012

PRE-REQUISITE

BMIW 3823

INDUSTRIAL DESIGN

CONSUMER PRODUCT DESIGN & DEVELOMENT/ REKABENTUK & PEMBANGUNAN PRODUK PENGGUNA (BMIW 3893)

LEARNING OUTCOMES

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

1. Explain the basic concepts of designing and developing consumer product.
2. Design and simulation using advance CAD tool in 3D.
3. Produce a sample of 3D consumer product prototype.

SYNOPSIS

This course enriches the students about design and development of consumer product. The principle to any successful consumer product is good design. Good design drives innovation and produces meaningful and memorable products that enchant customers and enhance brand performance. The aim of this course is to provide students with an understanding of designing and developing consumer product with in appropriate way. Emphasis is on 3D modelling generation skills which can be simulated at early stages of the design process. Students will explore the creation and editing of 3D parts using solid modelling and surface design in the context of feature-based design. They also will learn to consider consumer product guarantees, human factors and sustainable design in consumer product. Classroom activities will complement and will be supported by lab exercises with explanations and demonstration of related activities.

REFERENCES

- Karl T. Ulrich, Steven D. Eppinger (2016) Product Design & Development 6th edition.
- Robin R. (2016), Consumer Product Innovation and Sustainable Design. Routhledge.
- Elivio Bonollo (2016). Product Design: A Course in First Principles Upfront Publishing.
- Marcelo M.S. and Francisco Rebelo, (2016) Ergonomics in Design: Method and Techniques (Human Factor Ergonomics). press.

CYBER SECURITY IN DIGITAL MANUFACTURING/ KESELAMATAN SIBER DALAM PEMBUATAN DIGITAL (BMIW 3903)

LEARNING OUTCOMES

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

1. Distinguish the appropriate methods to safeguards the elements of information technology and network in digital manufacturing.
2. Build the elements in information technology and network with the appropriate methods and tools/ software in digital manufacturing.
3. Explain issues related to ethics and law in information technology and networks and relate it with cyber laws in Malaysia.

SYNOPSIS

This course covers background views of ICT threats and the needs to have theoretical security method on Information Security in Software, Operating System, Data Center, Computer Networks in digital manufacturing. The course will also cover the basic cryptographic elements and authentication, IP Security, Firewalls, Security Management, and the related issue in Computer Crimes and Cyber Laws. Security related computing namely Microsoft Excel and Windows 2012 will be introduced and used to help in understanding and applying the security mechanism and algorithms.

REFERENCES

- Michael Negnevitsky (2005). Artificial Intelligence:A Guide to Intelligent Systems, 2th Edition, China: Addison Wesley.
- Thomas Braunl (2008). Embedded Robotics: Mobile Robot Design and Applications with Embedded Systems, 3rd Edition, Springer.

ARTIFICIAL INTELLINGENCE/ KECERDASAN BUATAN (BMIW 3913)

LEARNING OUTCOMES

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

1. Analyze problems and synthesis solutions using Artificial Intelligence (AI) components such as Knowledge-Based and Expert Systems, Fuzzy Logic, Artificial Neural Network, and Genetic Algorithm.
2. Analyze operational performance of different components of AI in manufacturing system environments.
3. Demonstrates Design complex intelligent system based on components of intelligent functions.

SYNOPSIS

This course introduces students to the theory and concepts of artificial intelligent in building, analyzing, and synthesizing intelligent components of a manufacturing system. It examines the structure of knowledge-based system, expert systems, neural networks, fuzzy logic, and genetic algorithms. The implementation of artificial intelligent in manufacturing systems will be discussed and studied on actual practices. The concept of machine learning, vision system, and prospects of intelligentsystem in manufacturing operations will also be discussed.

REFERENCES

- Michael Negnevitsky (2005). Artificial Intelligence:AGuide to Intelligent Systems, 2th Edition, China: Addison Wesley.
- Thomas Braunl (2008). Embedded Robotics: Mobile Robot Design and Applications with Embedded Systems, 3rd Edition, Springer.

COMPOSITE COMPONENTS FOR AEROSPACE/ KOMPONENT KOMPOSIT UNTUK AEROANGKASA (BMIW 3863)

LEARNING OUTCOMES

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

1. Describe the basic principles of composite components in aerospace manufacturing.
2. Identify processes that involved in producing composite components for aerospace.
3. Apply the principles of manufacturing composite component for aerospace.

SYNOPSIS

The course consists of introduction to composite materials for aerospace, components in composite material, fibers, fabrics, matrices, classification of composites, lamina, laminate, type of composites and manufacturing technology of input raw material for composite fabrication, role of composite in major aircraft components, manufacturing process of composite materials, prepreg layup, liquid composite molding, resin transfer molding, vacuum-assisted RTM, resin film infusion as well as pultrusion.

REFERENCES

- Saha, P.K. (2017), Aerospace Manufacturing
- Processes, 1st Edition, CRC Press, Taylor & Francis Group, US.
- Daniel,I.M. and Ishai, O. (2006), Engineering
- Mechanics of Composite Materials, 2nd Edition, OxfordUniversity Press, UK.
- Bersee, H.E.N. (2010), Composites aerospace manufacturing processes, encyclopaedia of aerospace engineering, John Wiley & Sons Ltd., NJ.

PRE-REQUISITE

FUNDAMENTAL OF AEROSPACE MANUFACTURING

METALLIC COMPONENTS FOR AEROSPACE/ KOMPONEN LOGAM UNTUK AEROANGKASA (BMIW 4923)

LEARNING OUTCOMES

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

1. Describe the basic principles of metallic components in aerospace manufacturing.
2. Identify the process engaged in fabricating the metallic components for aerospace.
3. Apply the principles of manufacturing the metallic components for aerospace.

SYNOPSIS

This course consists of the Introduction to Major Manufacturing Process in Aerospace such as major forming and forging processes of metal products, welding and joining, metal cutting and machining, abrasive metal removal and cutting processes and chemical metal removal and chemical processing of metals; Introduction of Tribology in Manufacturing Processes such as surface topography, adhesion and friction models, lubrication, surface treatments and surface quality.

REFERENCES

- Halling, J. (1989) Principles of Tribology, Macmillan Education Ltd, London.
- Kalpakjian, S. (2014), Manufacturing Engineering and Technology, Addison Wesley, MA
- Saha, P.K. (2017) Aerospace Manufacturing Processes, CRC Press, Boca Raton.

PRE-REQUISITE

FUNDAMENTAL OF AEROSPACE MANUFACTURING

AEROSPACE COMPONENT MACHINING/ PEMESINAN KOMPONEN AEROANGKASA (BMIW 4933)

LEARNING OUTCOMES

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

1. Describe the principles and techniques of machining for Aerospace Components.
2. Construct CAD/CAM program from Three to Five- Axis machining for milling operations of Aerospace Components.
3. Create a complete CAD/ Program for any given actual industrial examples.

SYNOPSIS

This course provides concepts and techniques to prepare students with advanced computer numerical control (CNC), computer aided design (CAD) and computer aided manufacturing (CAM) application focusing on Aerospace Components. The course covers cutting planning & strategy as well as techniques in preparing the CAD / CAM program up to Five-Axis machining for metallic and composite Aerospace Components

REFERENCES

- Pradip K. Saha (2017), Aerospace Manufacturing Processes, CRC Press, Taylor & Francis Group.
- J. Srivinas (2016), CAD/CAM: Principles and Applications, Oxford University Press, India
- Michael Michaud (2012), CATIA Core Tools: Computer Aided Three-Dimensional Interactive Application, 1st Edition, McGraw-Hill Education.
- P N Rao (2010) CAD/CAM: Principles and Applications, 3rd Edition, Tata McGraw Hill Education Private Limited.

PACKAGING DESIGN & TECHNOLOGY/ REKABENTUK & TEKNOLOGI PEMBUNGKUSAN (BMIW 4943)

LEARNING OUTCOMES

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

1. Explain the type, material, and processes for packaging.
2. Analyse the packaging economics that abide packaging laws and regulations.
3. To design basics graphic and package base on material selection and marketing requirements.

SYNOPSIS

Principles of packaging present an overall of packaging and incorporates many disciplines to enable students to adequately convey and coordinate packaging activities. The course covers topics of introduction to packaging, fundamental components of packaging, essential elements of physical distribution, properties and sensitivity of different product, package system performance selection and packaging as marketing tool and designing the basic graphics of packaging.

REFERENCES

- Daniel Hellstr M Annika Olsson Fredrik Nilsson. Managing Packaging Design for Sustainable Development: A Compass For Strategic Direction, John Wileys. 2016.
- Mostokowitz H.R. et al. Packaging Research in Food Product Design and Development, Wiley. 2009.
- Luke, H. The Packaging and Design Templates Sourcebook (Graphic Design), Roto Vision. 2007.
- Kit L. Yam. The Wiley Encyclopaedia of Packaging Technology, J. Wiley & Sons 2009
- Klimchuk, Marianne Rosner, Packaging Design: Successful Product Branding from Concept to Shelf. Hoboken, NJ: John Wiley 2006.
- Steven D. and John S. Package Design Work Book: The Art and Science of Successful Packaging. Rockportu Publisher. 2011.

VEHICLE DESIGN & DEVELOPMENT/ REKABENTUK & PEMBANGUNAN KENDERAAN (BMIW 4953)

LEARNING OUTCOMES

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

1. Able to design modern type of sustainable vehicle.
2. Apply design and manufacturing skills and knowledge in developing new sustainable vehicles.
3. Develop ability to design and prototype for communicating and presenting ideas.

SYNOPSIS

The course will teach the student to understand evolutionary important elements in design and development of a modern sustainable vehicle. Students will learn the evolution of vehicle history and master suitable graphical software for vehicle design. Students will be shown how to present their concepts design at a professional level in an industrial situation. Students will also develop further understanding and application of the principles of vehicles design interior and exterior.

REFERENCES

- Mehrdan Ehsani and Yimin Gao, Modern Electric, Hybrid Electric and Fuel Cell Vehicles-Fundamentals, Theories and Design 2nd Edition. CRC Press.
- Stuart Macey and Geoff Wardle, (2014), H-Point, 2nd Edition: The Fundamentals of Car Design and Packaging. Design Studio Press.
- Mike Tovey, (2012), Design for Transport: A User-Centred Approach to Vehicle Design and Travel. Gower Publishing.

IT COMMUNICATION IN DIGITAL MANUFACTURING/ KOMUNIKASI IT DALAM PEMBUATAN DIGITAL (BMIW 4963)

LEARNING OUTCOMES

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

1. Analyse and solve industrial problems in manufacturing based on ICT solution.
2. Conducts some experiments based on the ICT applications and solution lab sheet requirements.
3. Demonstrates capabilities in designing and applying ICT solution in manufacturing.

SYNOPSIS

The use of information and communication technology (ICT) in the manufacturing has proven to have a positive impact in companies that have implemented it, since this enhances collaboration, improving the quality of information shared between suppliers and buyers. This course describes a vision of manufacturing in the 4th technology revolution that maximizes efficiencies and improvements by exploiting the capability of ICT. This course includes the role of ICT in manufacturing and why enterprise networking is essential such as modelling system and virtual factory, product data management (PDM) system, online analytical processing (OLAP), decision support system (DSS), customer relation management (CRM), computer integrated manufacturing (CIM), and enterprise resource planning (ERP).

REFERENCES

- Dennis L. Brandl and Donald E. Brandl, (2012) Plant IT: Integrating Information Technology into Automated Manufacturing, Momentum Press.
- Kusiak, A. (2000) Computational Intelligence in Design and Manufacturing, New York: John Wiley & Son.
- Kevin A. (2004) Information Technology for Manufacturing, St. Lucie Press.
- Mikell P. Groover, (2007) Automation, production systems, and computer-integrated manufacturing, Prentice Hall, 3rd Edition.

ADVANCE MANUFACTURING ENTERPRISE/ PERUSAHAAN PEMBUATAN TERMAJU (BMIW 4973)

LEARNING OUTCOMES

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

1. Demonstrates understanding on the concepts of ubiquity, clouds, services systems and the global idea of ubiquitous and cloud manufacturing.
2. Identify architecture of ubiquitous and cloud manufacturing in manufacturing enterprise.
3. Apply Ubiquitous Cloud Manufacturing System robustness in terms of interoperability, re-configurability and agility, efficiency and effectiveness in Manufacturing System.

SYNOPSIS

This course introduces students to the developmentof advanced manufacturing systems and enterprisesin response to the nowadays requirements for new industrialization and manufacturing revitalization. The concept of Ubiquitous and Cloud Manufacturing Systems (UCMS), is expected to deliver the next generation of methods and means for enabling modern manufacturing enterprises capable to respond to the above-mentioned requirements.

REFERENCES

- Weidong Li, Jörn Mehnen (2013). Cloud Manufacturing: Distributed Computing Technologies for Global and Sustainable Manufacturing: Springer Link.
- Marianne Bradford (2015). Modern ERP: Select, Implement, and Use Today’s Advanced Business Systems: (3rd Edition). Lulu Press, Inc.

CURRICULUM STRUCTURE OF
TECHNOLOGY PROGRAMME

BMIK

PROGRAM DETAILS

BACHELOR OF TECHNOLOGY IN WELDING WITH HONOURS

BMIK is designed to produce competent technologists with expertise in welding engineering technology and advanced joining processes. The programme emphasizes technical knowledge, welding and fabrication processes, welding metallurgy, materials technology, quality assurance, non-destructive testing (NDT), automation, robotic welding, and Industry 4.0 technologies supported by industry-based learning experiences. Graduates of BMWD are equipped with the skills and competencies required to plan, supervise, evaluate, and optimize welding and fabrication operations in modern industrial environments. They are prepared to pursue careers as Welding Technologists, Welding Inspectors, Welding Engineers, Quality Engineers, Fabrication Engineers, Production Engineers, NDT Specialists, Materials Engineers, and other related roles across the manufacturing, oil and gas, construction, automotive, aerospace, shipbuilding, and heavy engineering sectors. The programme aims to produce future-ready technologists capable of driving technological innovation, ensuring structural integrity and product quality, enhancing productivity, implementing sustainable manufacturing practices, and contributing to the advancement of welding and fabrication industries at both national and international levels.

BMIK

Programme Educational Objectives (PEO)

Programme Educational Objectives (PEO) is specific goals describing expected achievements of graduates in their career and professional life three to five years after the graduation.

PEO 1	To produce welding technologist that perform related welding work including maintenance, fabricator, designer, safety advisor, and production manager.
PEO 2	To produce technopreneurs in related welding technology.
PEO 3	To produce relevant, respected, and referred professionals in welding technology.

BMIK

Programme Outcomes (PO)

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

PO1	Apply knowledge of technology fundamentals to broadly-defined procedures processes, systems and methodologies in industrial machining.
PO2	Able to suggest and apply latest tools and techniques to solve broadly-defined problems.
PO3	Demonstrate strong analytical and critical thinking skills to solve broadly-defined problems in industrial machining.
PO4	Able to communicate and articulate effectively in both verbal and written among technologist communities and society at large.
PO5	Demonstrate understanding of the societal related issues and the consequent responsibilities relevant to broadly-defined technology practices.
PO6	Recognize the needs for professional development and to engage independent lifelong learning in specialist technologists.
PO7	Demonstrate an awareness of management and technopreneurship practices in real perspective.
PO8	Demonstrate professionalism and social and ethical consideration.
PO9	Demonstrate leadership quality, mentoring and work effectively in diverse teams.

BMIK

Curriculum Details & Structure 2026/2027

	YEAR 1		YEAR 2		YEAR 3			YEAR 4	Credits
						Work Based Learning (WBL)			
	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 3	Sem. 1	
University Compulsory Courses	BKK* ***1 Co-Curriculum I	BKK* ***1 Co-Curriculum 2	BLLW 3162 English For Professional Interaction	**BLHW 2792 Integrity and Anti-Corruption					18
	BLLW 1142 English for Academic Purposes	BLLW 2152 Academic Writing	BLHW 2722 Malaysian Nation State Aspiration/ *BLHW 2762 Malaysian Citra						
		BTMW 1112 Basic Technoprenuer							
	BLLW ***2 Third Language	BLHW 1772 Philosophy and Current Challenges/ *BLHW 1762 Philosophy and Current Issues							
Programme Core Course				BTMW 2124 Capstone Technopreneurship 1	BTMW 3134 Capstone Technopreneurship 2				8
					BMXX XXX0 Professional Certificate Preparation Course				
Faculty Core	BMIK 1014 Safety In Welding	BMIK 1043 Product Design in Welding	BMIK 2074 Imperfection in Welding	BMIK 2114 Computer Aided Analysis	BMIK 3133 Safety Management	BMIU 3134i Final Year Project 1	BMIU 3186i Final Year Project 2	BMIU 42112i Industrial Training	90
	BMIK 1024 Cad And Welding Graphics	BMIK 1064 Non-Conventional Welding Process	BMIK 2084 Materials Behaviour in Welding	BMIK 2134 Non-Destructive Test	BMIK 3144 Economic of Welding and Procurement	BMIK 3204i Welding Repair			
	BMIK 1034 Metal Fabrications Technology	BMIK2124 Electrical Welding Equipment	BMIK3193 Cyber Physical Systems in Welding	BMIK1054 Welding Documentation		BMIK 3213i Managing Production and Supervision			
			BMIK 2104 Welding Design Analysis			BMIK 3224i Welding Quality Assurance			
Electives Courses					BMIK 31*4 Elective 1				4
Credits	17	18	19	18	15	15	6	12	120

** For International Student Only*

*** Referring to Non-Credit Course Exemption (if student attained Credit Transfer for Integrity and Anti-Corruption, then students will be required to replace the credit with Critical and Creative Thinking)*

BMIK Elective Courses

Elective 1	Language Electives Courses	Professional Certificate Preparation Courses
• BMIK 3154 Non-Destructive Test for Professional • BMIK 3164 Welding Technology for Professional • BMIK 3174 Welding Inspection for Professional • BMIK 3114 Underwater Welding and Inspection for Professional • BMIK 3124 Corrosion and Surface Protection for Professional • BMIK 3194 Painting and Blasting for Professional	• BLLW 1212 Arabic Language • BLLW 1222 Mandarin Language • BLLW 1232 Japanese Language • BLLW 1172 Bahasa Melayu Komunikasi 1* • BLLW 1242 Korean Language 1 • BLLW 1252 German 1 *For international students only	• BMID 3100 Certified SolidWorks Associate • BMMA 3100 Certified CATIA V5 – Part Design Associate • Certification Scheme for Welding and Inspection Personnel – Visual Welding Inspector (CSWIP 3.0) • Pensijilan Ujian Tanpa Musnah Bagi Program Ultrasonik – Binaan Berkimpalan (Plat & Paip) Minyak Dan Gas Tahap 1 Dan 2 - JPK • OGSP (Oil & Gas Safety Passport) • CIDB Green Card

BMIK

Work Based Learning

FTKIP offers two Work-Based Learning (WBL) programs: Bachelor of Technology in Welding and Bachelor of Technology in Industrial Machining. Under this program, students will complete two and a half years of study on campus, followed by one year of industrial internship or WBL. Through WBL, students gain practical training, real industry experience, and valuable exposure to real workplace culture.

Key Features

- Work based Learning (WBL) is a subset of workplace learning. WBL provides student with real life work experience where they can apply academic and technical skills and develop their employability
- Integrate university curriculum with the workplace to create different learning paradigm
- WBL is general preparation for the real world, whereby higher educational programmes include work-based competency skills in course programmes as well as course delivery methods
- The development and assessment of skills within and directly related to the workplace

(Reference: GGP WBL MQA 2016)

General Structure of the Bachelor of Technology

SEMESTER	KREDIT		FACULTY/ INDUSTRY
	BMIM	BMIK	
1	17	17	Faculty
2	18	18	Faculty
3	17	19	Faculty
4	18	18	Faculty
5	18	15	Faculty
6	14	15	Industry (WBL)
Khas	6	6	Industry (WBL)
7	12	12	Industry (Industrial Training)

MOD INDUSTRI

BMIK

WORK-BASED LEARNING (WBL): STRUCTURED INTERNSHIP PROGRAM PLAN
(1 YEAR)

<table>
<tr><td rowspan="3">Mar-26</td><td>W1</td><td rowspan="5">Welding Repair
(BMIK 3204i)
5 WEEKS</td><td rowspan="20">Final Year Project 1 (BMIU 3134i)</td></tr>
<tr><td>W2</td></tr>
<tr><td>W3</td></tr>
<tr><td rowspan="4">Apr-26</td><td>W4</td></tr>
<tr><td>W5</td></tr>
<tr><td>W6</td><td rowspan="5">Managing Production and Supervision
(BMIK 3213i)
5 WEEKS</td></tr>
<tr><td>W7</td></tr>
<tr><td rowspan="5">May-26</td><td>W8</td></tr>
<tr><td>W9</td></tr>
<tr><td>W10</td></tr>
<tr><td>W11</td><td rowspan="4">Welding Quality Assurance
(BMIK 3224i)
4 WEEKS</td></tr>
<tr><td>W12</td></tr>
<tr><td rowspan="4">Jun-26</td><td>W13</td></tr>
<tr><td>W14</td></tr>
<tr><td>W15</td><td></td></tr>
<tr><td>W16</td><td></td></tr>
<tr><td rowspan="4">Jul-26</td><td>W17</td><td></td></tr>
<tr><td>W18</td><td></td></tr>
<tr><td>W19</td><td></td></tr>
<tr><td>W20</td><td></td></tr>
<tr><td rowspan="4">Aug-26</td><td>W21</td><td colspan="2" rowspan="8">Final Year Project 2 (BMIU 3186i)</td></tr>
<tr><td>W22</td></tr>
<tr><td>W23</td></tr>
<tr><td>W24</td></tr>
<tr><td rowspan="5">Sep-26</td><td>W25</td></tr>
<tr><td>W26</td></tr>
<tr><td>W27</td></tr>
<tr><td>W28</td></tr>
<tr><td>W29</td><td colspan="2" rowspan="3">Industrial Training (BMIU 42112i)</td></tr>
<tr><td>Oct-26 - Feb-27</td><td>W30 - W51</td></tr>
<tr><td>Mar-27</td><td>W52</td></tr>
</table>

BMIM

PROGRAM DETAILS

BACHELOR OF TECHNOLOGY IN INDUSTRIAL MACHINING WITH HONOURS

BMIM is designed to produce competent technologists with expertise in advanced machining technologies and modern manufacturing systems. The programme emphasizes technical knowledge, precision machining processes, computer-aided manufacturing (CAM), CNC machining, automation, metrology, quality control, and Industry 4.0 technologies supported by industry-based learning experiences. Graduates of BMIM are equipped with the skills and competencies required to operate, manage, and optimize machining and manufacturing operations in technologically advanced industrial environments. They are prepared to pursue careers as Machining Technologists, CNC Specialists, Manufacturing Engineers, Production Engineers, Quality Engineers, Tooling Engineers, Process Engineers, and other related roles across the manufacturing, automotive, aerospace, oil and gas, electronics, and precision engineering sectors. The programme aims to produce future-ready technologists capable of driving innovation, enhancing productivity, implementing sustainable manufacturing practices, and contributing to the advancement of the machining and manufacturing industries at both national and international levels.

BMIM

Programme Educational Objectives (PEO)

Programme Educational Objectives (PEO) is specific goals describing expected achievements of graduates in their career and professional life three to five years after the graduation.

PEO 1	To produce machining technologist that perform related work including machinist, designer, manufacturer, maintenance, facility manager and production manager.
PEO 2	To produce technopreneurs in machining related technology.
PEO 3	To produce relevant, respected and referred professionals in machining technology.

BMIM

Programme Outcomes (PO)

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

PO1	Apply knowledge of technology fundamentals to broadly-defined procedures processes, systems and methodologies in industrial machining.
PO2	Able to suggest and apply latest tools and techniques to solve broadly-defined problems.
PO3	Demonstrate strong analytical and critical thinking skills to solve broadly-defined problems in industrial machining.
PO4	Able to communicate and articulate effectively in both verbal and written among technologist communities and society at large.
PO5	Demonstrate understanding of the societal related issues and the consequent responsibilities relevant to broadly-defined technology practices.
PO6	Recognize the needs for professional development and to engage independent lifelong learning in specialist technologists.
PO7	Demonstrate an awareness of management and technopreneurship practices in real perspective.
PO8	Demonstrate professionalism and social and ethical consideration.
PO9	Demonstrate leadership quality, mentoring and work effectively in diverse teams.

BMIM

Curriculum Details & Structure 2026/2027

	YEAR 1		YEAR 2		YEAR 3			YEAR 4	Credits
	Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Work Based Learning (WBL)			
						Sem. 2	Sem. 3	Sem. 1	
University Compulsory Courses	BKK* ***1 Co-Curriculum I	BKK* ***1 Co-Curriculum 2	BLHW 2722 Malaysian Nation State Aspiration/ *BLHW 2762 Malaysian Citra		BLLW 3162 English For Professional Interaction				18
	BLLW 1142 English for Academic Purposes	BLLW 2152 Academic Writing	BLHW 1772 Philosophy and Current Challenges/ *BLHW 1762 Philosophy and Current Issues						
	BLLW ***2 Third Language	**BLHW 2792 Integrity and Anti-Corruption	BTMW 1112 Basic Technoprenuer						
Programme Core Course				BTMW 2124 Capstone Technopreneurship 1	BTMW 3134 Capstone Technopreneurship 2				8
					BMXX XXX0 Professional Certificate Preparation Course				
Faculty Core	BMIM 1013 Product Drafting and Specification	BMIM 1054 Tool Setup and Refurbishment	BMIM 2094 Precision and Finishing in CNC Technology	BMIM 2123 Multi Axis Machining	BMIM 3224 Rework and Restoration of Machined Component	BMIU 3134i Final Year Project 1	BMIU 3186i Final Year Project 2	BMIU 42112i Industrial Training	90
	BMIM 1023 Standard Product Precision	BMIM 1063 Sustainable Machining	BMIM 2103 Precision and Finishing in EDM and Grinding Technology	BMIM 2134 Complex CADCAM Product	BMIM 3224 Surface Aesthetics of Machined Component	BMIM 3234i Machine Maintenance			
	BMIM 1033 Workpiece and Cutting Tool Properties	BMIM 1073 Condition Monitoring in Machining	BMIM 2114 Prismatic CADCAM Product	BMIM 2143 Heat Treatment of Machined Component		BMIM 3243i Project Management and Supervision			
	BMIM 1043 Jig and Fixtures	BMIM 1083 Assessment of Machinability		BMIM 2154 Assembly Method		BMIM 3253i Acts and Risks Assessment in Machining Production			
Electives Courses					BMIM 31*4 Elective 1				4
Credits	17	18	17	18	18	14	6	12	120

** For International Student Only*

*** Referring to Non-Credit Course Exemption (if student attained Credit Transfer for Integrity and Anti-Corruption, then students will be required to replace the credit with Critical and Creative Thinking)*

BMIM Elective Courses

Elective 1	Language Electives Courses	Professional Certificate Preparation Courses
• BMIM 3164 Tool and Die Making • BMIM 3174 Rapid Machining • BMIM 3184 Aerospace Machining • BMIM 3194 Human Factor Technology • BMIM 3204 Production Planning in Machining	• BLLW 1212 Arabic Language • BLLW 1222 Mandarin Language • BLLW 1232 Japanese Language • BLLW 1172 Bahasa Melayu Komunikasi 1* • BLLW 1242 Korean Language 1 • BLLW 1252 German 1 *For international students only	• BMID 3100 Certified SolidWorks Associate • BMMA 3100 Certified CATIA V5 – Part Design Associate

BMIM

Work Based Learning

FTKIP offers two Work-Based Learning (WBL) programs: Bachelor of Technology in Welding and Bachelor of Technology in Industrial Machining. Under this program, students will complete two and a half years of study on campus, followed by one year of industrial internship or WBL. Through WBL, students gain practical training, real industry experience, and valuable exposure to real workplace culture.

Key Features

- Work based Learning (WBL) is a subset of workplace learning. WBL provides student with real life work experience where they can apply academic and technical skills and develop their employability
- Integrate university curriculum with the workplace to create different learning paradigm
- WBL is general preparation for the real world, whereby higher educational programmes include work-based competency skills in course programmes as well as course delivery methods
- The development and assessment of skills within and directly related to the workplace

(Reference: GGP WBL MQA 2016)

General Structure of the Bachelor of Technology

SEMESTER	KREDIT		FACULTY/ INDUSTRY
	BMIM	BMIK	
1	17	17	Faculty
2	18	18	Faculty
3	17	19	Faculty
4	18	18	Faculty
5	18	15	Faculty
6	14	15	Industry (WBL)
Khas	6	6	Industry (WBL)
7	12	12	Industry (Industrial Training)

MOD INDUSTRI

BMIM

WORK-BASED LEARNING (WBL): STRUCTURED INTERNSHIP PROGRAM PLAN
(1 YEAR)

<table>
<tr><td rowspan="3">Mar-26</td><td>W1</td><td rowspan="5">Acts and Risks Assessment in Machining Production
(BMIM 3253i)
5 WEEKS</td><td rowspan="20">Final Year Project 1 (BMIU 3134i)</td></tr>
<tr><td>W2</td></tr>
<tr><td>W3</td></tr>
<tr><td rowspan="4">Apr-26</td><td>W4</td></tr>
<tr><td>W5</td></tr>
<tr><td>W6</td><td rowspan="5">Machine Maintenance
(BMIM 3234i)
5 WEEKS</td></tr>
<tr><td>W7</td></tr>
<tr><td rowspan="5">May-26</td><td>W8</td></tr>
<tr><td>W9</td></tr>
<tr><td>W10</td></tr>
<tr><td>W11</td><td rowspan="5">Project Management and Supervision
(BMIM 3243i)
5 WEEKS</td></tr>
<tr><td>W12</td></tr>
<tr><td rowspan="4">Jun-26</td><td>W13</td></tr>
<tr><td>W14</td></tr>
<tr><td>W15</td></tr>
<tr><td>W16</td><td></td></tr>
<tr><td rowspan="4">Jul-26</td><td>W17</td><td></td></tr>
<tr><td>W18</td><td></td></tr>
<tr><td>W19</td><td></td></tr>
<tr><td>W20</td><td></td></tr>
<tr><td rowspan="4">Aug-26</td><td>W21</td><td colspan="2" rowspan="8">Final Year Project 2 (BMIU 3186i)</td></tr>
<tr><td>W22</td></tr>
<tr><td>W23</td></tr>
<tr><td>W24</td></tr>
<tr><td rowspan="5">Sep-26</td><td>W25</td></tr>
<tr><td>W26</td></tr>
<tr><td>W27</td></tr>
<tr><td>W28</td></tr>
<tr><td>W29</td><td colspan="2" rowspan="3">Industrial Training (BMIU 42112i)</td></tr>
<tr><td>Oct-26 - Feb-27</td><td>W30 - W51</td></tr>
<tr><td>Mar-27</td><td>W52</td></tr>
</table>

FINAL YEAR PROJECT 1/ PROJEK TAHUN AKHIR 1 (BMIU 3134i)

LEARNING OUTCOMES
Upon completion of this course, student should be able to:
1. Analyse the problem, objective and scope of project associated to the industrial or community needs.
2. Use relevant theory to produce solution.
3. Present the preliminary findings in the oral and written forms effectively.

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, and methodology to overcome theproblem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES
- Manual Projek Sarjana Muda (PSM).

FINAL YEAR PROJECT 2/ PROJEK TAHUN AKHIR 2 (BMIU 3186i)

LEARNING OUTCOMES
Upon completion of this course, student should be able to:
1. Analyze data in a meaningful form using relevant tools.
2. Perform project implementation systematically.
3. Present the results in the oral and written forms.

SYNOPSIS
This is the second part of the Bachelor Degree Project. Students are expected to continue the project performed in Bachelor Degree Project until completion. At the endof the semester, students are required to submit the Bachelor Degree Project report and present their projectsfor assessment.

REFERENCES
- Manual Projek Sarjana Muda (PSM).
- Faculty Student ‘s Log Book.
- Faculty Final Year Project Guide Book

INDUSTRIAL TRAINING/ LATIHAN INDUSTRI (BMIU 42112i)

LEARNING OUTCOMES

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

1. Solve technology related problems using methods,tools and techniques learnt throughout the training.
2. Explain effectively with the technical community and produce technical reports and presentations.
3. Demonstrate social ethics and professionalism intechnology practice.

SYNOPSIS

Industrial Training is a compulsory component of the degree programme undertaken during Semesters 6 and 7 through a series of structured courses. This training provides students of Universiti Teknikal Malaysia Melaka (UTeM) with valuable industry exposure, enabling them to acquire practical knowledge, technical competencies, and professional skills that enhance their employability upon graduation. During the industrial placement, students are expected to engage in relevant industrial activities designed to achieve the intended learning outcomes. These activities may include manufacturing and production processes, process optimization, mechanical design and development, implementation of production systems, equipment maintenance and repair, as well as the manufacturing and testing of industrial products and components. Students are also expected to participate in quality control and quality assurance practices to gain a comprehensive understanding of industrial operations.

REFERENCES

- Faculty Student ‘s Log Book.
- Faculty Final Year Project Guide Book.

WORK BASED LEARNING (WBL) BMIM

SYNOPSIS

Work-Based Learning (WBL) is an innovative educational approach that integrates academic knowledge with authentic workplace experiences to strengthen students’ employability and professional competencies. By bridging classroom learning with industry practice, WBL provides students with meaningful exposure to real-world environments, enabling them to develop technical expertise, problem-solving abilities, and professional values in line with current industry demands.

Within the BMIM program, WBL is systematically embedded across Semester 6 and 7 through a series of structured courses, including:

- BMIM 3253i Acts and Risks Assessment in Machining Production
- BMIM 3234i Machine Maintenance
- BMIM 3243i Project Management and Supervision

In addition, WBL is reinforced through the implementation of capstone and industrial components, namely:

- BMIU 3134i Final Year Project 1
- BMIU 3186i Final Year Project 2
- BMIU 42112i Industrial Training

This structured integration ensures that graduates of the BMIM program are industry-ready, with both academic grounding and extensive workplace-based learning experiences.

REFERENCES

- Peraturan dan Garis Panduan Pelaksanaan Pembelajaran Berasaskan Kerja (Work-Based Learning, WBL) Universiti Teknikal Malaysia Melaka, Pejabat Perancangan dan Pembangunan Akademik, Pejabat Timbalan Naib Canselor (Akademik dan Antarabangsa), Penerbit UTeM, Edisi 2022.
- Advisory Note No. 1/2025, Pendekatan Pembelajaran Mod Industri, Malaysia Qualification Agency.
- Buku Panduan Work Based Learning (WBL) Sarjana Muda Teknologi Kimpalan Dengan Kepujian Universiti Teknikal Malaysia Melaka, Edisi Kedua 2024.
- Buku Panduan Work Based Learning (WBL) Sarjana Muda Teknologi Kimpalan Dengan Kepujian Universiti Teknikal Malaysia Melaka, Edisi Kedua 2024.

WORK BASED LEARNING (WBL) BMIK

SYNOPSIS

Work-Based Learning (WBL) is an innovative educational approach that integrates academic knowledge with authentic workplace experiences to strengthen students' employability and professional competencies. By bridging classroom learning with industry practice, WBL provides students with meaningful exposure to real-world environments, enabling them to develop technical expertise, problem-solving abilities, and professional values in line with current industry demands.

Within the BMIK program, WBL is systematically embedded across Semester 6 and 7 through a series of structured courses, including:

- BMIK 3204i Welding Repair
- BMIK 3213i Managing Production and Supervision
- BMIK 3224i Welding Quality Assurance

In addition, WBL is reinforced through the implementation of capstone and industrial components, namely:

- BMIU 3134i Final Year Project 1
- BMIU 3186i Final Year Project 2
- BMIU 42112i Industrial Training

This structured integration ensures that graduates of the BMIK program are industry-ready, with both academic grounding and extensive workplace-based learning experiences.

REFERENCES

- Peraturan dan Garis Panduan Pelaksanaan Pembelajaran Berasaskan Kerja (Work-Based Learning, WBL) Universiti Teknikal Malaysia Melaka, Pejabat Perancangan dan Pembangunan Akademik, Pejabat Timbalan Naib Canselor (Akademik dan Antarabangsa), Penerbit UTeM, Edisi 2022.
- Advisory Note No. 1/2025, Pendekatan Pembelajaran Mod Industri, Malaysia Qualification Agency.
- Buku Panduan Work Based Learning (WBL) Sarjana Muda
- Teknologi Kimpalan Dengan Kepujian Universiti Teknikal Malaysia Melaka, Edisi Kedua 2024.
- Buku Panduan Work Based Learning (WBL) Sarjana Muda
- Teknologi Kimpalan Dengan Kepujian Universiti Teknikal Malaysia Melaka, Edisi Kedua 2024.

PROGRAM CORE COURSES BMIK

SAFETY IN WELDING/ KESELAMATAN DALAM KIMPALAN (BMIK 1014)

LEARNING OUTCOMES

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

1. Apply the welding risk control based on procedures in the working environment.
2. Evaluate welding hazards that impact the safety, health, and environment at working area.
3. Create control method to minimize the impact of possible hazard in the working environment.

SYNOPSIS

The aim of this course is to expose students on safety practices and procedures. The students are required to identify types of hazards that may incur in industries especially related to welding processes. The students are required to understand equipment,

REFERENCES

- AWS, Welding Handbook Vol 1, 2 & 3, 9th Edition, 2001.
- AWS, ANSI Z49.1:2012, Safety in Cutting, Welding, and Allied Process, 2012.
- John Cadick et.all. Electrical safety handbook, 2012.

CAD AND WELDING GRAPHICS/CAD DAN GRAFIK KIMPALAN (BMIK 1024)

LEARNING OUTCOMES

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

1. Explain the engineering drawings include welding symbol and standard codes.
2. Construct technical drawing using manual sketching and computer aided design.
3. Communicate by using engineering drawings for welding application.

SYNOPSIS

The course will provide students with an understanding of the importance of engineering graphics as a communication tool specially for welding application. Student will be exposed to geometry drawing, orthographic drawing, section view, isometric drawing, assembly drawing, dimension, tolerance, welding symbol and standard codes using manual sketches and computer aided design (CAD) software.

REFERENCES

- Dix, M. & Riley, P., 2014, Discovering AutoCAD 2017 Prentice Hall, New York.
- Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. and Novak, J. E., 2016, Technical Drawing, 15th Ed., Prentice Hall, New York.
- Jensen, C., & Jay D. H., 2007, Engineering Drawing and Design, 7th Ed., Glencoe and McGraw Hill, New York.
- James D. Bethune, 2018, Engineering Graphics with AutoCAD 2017, Prentice Hall.
- E. N. Gregory and A. A. Armstrong, 2005, Welding symbol on drawing, Woodhead Publishing Ltd and CRC Press LLC.

METAL FABRICATIONS TECHNOLOGY/ TEKNOLOGI FABRIKASI LOGAM (BMIK 1034)

LEARNING OUTCOMES

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

1. Manipulating the basic principles and scientific processes and materials to produce products with reasonable judgment.
2. Demonstrate understanding of the concept and use of the terms contained in metal fabrication and welding technology.
3. Organizing themselves either its individuals or in groups during project generating process.

SYNOPSIS

This course is to equip students with the knowledge of metal fabrication and welding technology to improve manufacturing expertise in providing human capital with development at par with global technological developments.

REFERENCES

- Kalpakjian, Schmid, Steven R. (2018). Manufacturing Engineering and Technology - 7th ed. Pearson India.
- Yogesh Jaluria (2018). Advanced Materials Processing and Manufacturing (Engineering Series)
- - 1st ed. Springer.
- Larry Jeffus (2018) Welding: Principles and Applications - 8th ed. Cengage Learning.
- T.S. Srivatsan, T.S. Sudarshan, K. Manigandan (2018) - Manufacturing Techniques for Materials: Engineering and Engineered- 1st ed. CRC Press.
- Myer Kutz (2015). Mechanical Engineers' Handbook: Materials and Engineering Mechanics- 4th ed. Wiley.
- Jerry P. Byers (2017). Metalworking Fluids (Manufacturing Engineering and Materials Processing) - 3rd ed. CRC Press.
- 7. Josef Dillinger & Falko Wieneke (2016). Metal Engineering Textbook. Europa Lehrmittel Verlag.

PRODUCT DESIGN IN WELDING/ REKABENTUK PRODUK DALAM KIMPALAN (BMIK 1043)

LEARNING OUTCOMES

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

1. Describe and apply the principles of product design and development.
2. Organizes and develop a practical design solution through a systematic investigation of the product design problem.
3. Ability to work effectively in group to apply knowledge of entrepreneurships in the process of product design and development.

SYNOPSIS

Product Design in Welding blends the perspectivesof marketing, design and manufacturing into a single approach to product development. As a result, this course provides the students with an appreciation for the realities of industrial practice and for the complex and essential roles played by various members of product development teams. Throughout this course, attempts are made tostrike a balance between theory and practical.

REFERENCES

- H. Boejang, H. Attan, M.F. Basar, M.I Ramli, (2013) Module 4: Product Development for Engineering Technology, 1st Edition, Penerbit Universiti, UTeM, Melaka, Malaysia.
- K.T. Ulrich, S.D. Eppinger, (2016), Product Design and Development, 6th Edition, McGraw Hill Irwin.
- A.K. Chitale and R.C. Gupta, (2013), Product Design and Manufacture, 6th Prentice Hall, New Delhi, India.
- S. Kalpakjian, Steven R Schmid, (2014) Manufacturing Engineering & Technology, 7th Edition, Prentice Hall, 2014.

WELDING DOCUMENTATION/ DOKUMENTASI KIMPALAN (BMIK 1054)

LEARNING OUTCOMES

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

1. Apply knowledge on welding procedure qualification and welder qualification.
2. Construct PQR, WPS, WQR & Welding Symbol according to related standard.
3. Demonstrate type of welding drawing design and symbol in welding as required according to related standard.

SYNOPSIS

This course is to provide the students with understanding and practical approach in writing the essential documents in welding. The student will be exposed with ASME section IX code where the students will practice to write PQR, WPS, and WQR and interpreting all welding variables for procedure and welder qualification. Students also will be exposed with all welding symbols and welding geometry and all documents related with welding inspection.

REFERENCES

- ASME (2015), Boiler and Pressure Vessel Code Section IX.
- Standards: American Welding Society (AWS), D1.1 (2015).
- David J Hoffman, Kevin R Dahle, David J Fisher (2016). Welding. New Jersey: Pearson Education David J Hoffman.

NON-CONVENTIONAL WELDING PROCESS/ PROSES KIMPALAN BUKAN KONVENSIONAL (BMIK 1064)

LEARNING OUTCOMES

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

1. Identify types of joining processes applied in manufacturing sector.
2. Practice the joining processes using certain equipmentto make variety of joints.
3. Explain the characteristics of joining in terms of process, equipment and setup.

SYNOPSIS

This course is to provide student with welding processes that are not commonly used in the current industries that can be categories as new or advanced welding technology. Students will be exposed all welding processes and required should be able to perform process selection whendeal with the special and complex demand of welding work.

REFERENCES

- Kapil Gutha (2017). Advanced Manufacturing Technologies: Modern Machining, Advanced Joining, Sustainable Manufacturing (Materials Forming, Machining and Tribology)- 1st ed. Springer.
- Edward R.Bohnart (2017). Welding Principles andPractices - 1st ed. Ma-Graw-Hill Education.
- David J. Hoffman, Kevin R.Dahle, David J.Fisher (2016). Welding - 2nd ed. Pearson.
- Andrew D. Althouse (2018). Modern Welding -12th ed. Goodheart-Willcox.

IMPERFECTION IN WELDING/ KECACATAN KIMPALAN (BMIK 2074)

LEARNING OUTCOMES

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

1. Apply welding inspection method.
2. Implement the characteristics of metal properties and destructive testing.
3. Analyse the inspection and other NDE methods.

SYNOPSIS

The course will provide students with knowledge of identifying types of defects and the strategy of controlling the imperfection. The students will also require to perform mechanical destructive test that is tensile, bending, copy and hardness test. The competence required for checking fabrication materials, structural alignment & dimensions, checking welding quality (welding defect/distortion and weld repair).

REFERENCES

- Amitava Mitra (2016). Fundamentals of QualityControl and Improvement. J. Paul Guyer (2017). An Introduction to Welding Inspection.
- John C. Uppold (2015). Welding Metallurgy and Weldability.
- Ram Babu Sao (2016). Perfect: Quality Assurance & Quality Control. New York: CreateSpace Independent Publishing Platform.
- David J Hoffman, Kevin R Dahle, David J Fisher (2016). Welding. New Jersey: Pearson Education

MATERIALS BEHAVIOUR IN WELDING/ SIFAT BAHAN DALAM KIMPALAN (BMIK 2084)

LEARNING OUTCOMES

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

1. Classify metals based on generic properties, structural relationships with properties, especially the emergence of microstructures by heat treatment methods for the metal class.
2. Explain the behaviour of structural in fusion welding and testing of materials welded joints.
3. Discuss the classification of composite and ceramic based on the testing and the microstructure.

SYNOPSIS

This course describes the materials used in engineering. Scope covers Materials introduction; latest developments in materials, introduction to metal, metal forging. Metal structure; scale relationship with nature, and phase diagram. This course also will provide the students with understanding of the Microstructure development with heat treatment and mechanical properties. The students will be exposed to light alloy processing and diffusion process with microstructural appearance on thermal and mechanical properties. This course also covers the knowledge of the ceramic classification, polymer classification and composite on microstructure relationship and mechanical properties.

REFERENCES

- Neville, A. M. (2015). Concrete technology. Harlow, England ; New York :Prentice Hall. LC Call Number: TA439.N46.
- Askeland, Donald R.; Pradeep P. Phulé (2016). The Science & Engineering of Materials. Thomson-Engineering. LC Call Number: TA403.D87 2010.
- Callister, Jr., William D. (2014). Materials Science and Engineering – An Introduction. John Wiley and Sons. LC Call number: TA403 .C33 2011.
- Lewis, P.R., Reynolds, K. & Gagg, C. (2003). Forensic Materials Engineering: Case Studies. Boca Raton: CRC Press. LC Call number: TA219 .L48 2004.
- Mathews, F.L. & Rawlings, R.D. (1999). Composite Materials: Engineering and Science. Boca Raton: CRC Press. LC Call number: TA418.9.C6 .M37 1999.

SAFETY MANAGEMENT/ PENGURUSAN KESELAMATAN (BMIK 3133)

LEARNING OUTCOMES

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

1. Explain the different requirements and regulations of Factory and Machinery Act, Occupational Safety and Health Act.
2. Conduct hazard identification and risk assessment in workplace.
3. Construct preventive and control technique according to the acts pertinent to the Occupational Safety and Health.

SYNOPSIS

Safety management is a course that design to provide knowledge for managing activities in the business workplace that apply comprehensive management system designed to manage safety elements in the workplace. It includes acts, policy, objectives, plans, risk assessment, procedures, organization, responsibilities and other measures. This is important to prevent accidents, injuries and other impact to the organization that shows the role of management that focus to deter such catastrophic.

REFERENCES

- Taylor, J. B. (2012). Safety culture: assessing and changing the behaviour of organisations. Gower Publishing, Ltd.
- Geller, E. S. (2017). Working safe: How to help people actively care for health and safety. CRC Press.
- Bahari, I. (2002). Pengaturan sendiri di dalam pengurusan keselamatan dan kesihatan pekerjaan. Mc Graw Hill.
- Griffith, A., & Howarth, T. (2014). Construction health and safety management. Routledge.

WELDING DESIGN ANALYSIS/ ANALISIS REKABENTUK KIMPALAN (BMIK 2104)

LEARNING OUTCOMES

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

1. Describe basic concepts and fundamental principles of mechanical applications.
2. Apply basic concepts and fundamental principles to solve design for welding application.
3. Analyze basic problems in design considerations for welding.

SYNOPSIS

The course covers: Static: General principle, Force vector and Equilibrium of Particle; Mechanics: Principle of Stress & Strain, Torsion; Mechanics: Pure Bending and analysis and design of beams for bending; Welded design Program; Design Equations; Welded design Considerations; Design for welded join; Weld join design

REFERENCES

- Hibbeler, R.C., 2016, Engineering Mechanics-Statics, 14th Editions, Pearson.
- Beer, F.P., Johnston E.R, DeWolf J.T and Mazurek D.F, 2015, Mechanics of Materials 7th Editions in SI Units, McGraw-Hill.
- Design for welding, Welding Handbook Chapter Committee on Design for Welding, 2003, American Welding society.
- V.M. Radhakrishnan 2005, Welding Technology and Design.

ELECTRICAL WELDING EQUIPMENT/ PERKAKASAN ELEKTRIK KIMPALAN (BMIK 2124)

LEARNING OUTCOMES

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

1. Examine the physical phenomenon occurring in the arc and the types of forces and metal transfer in the arc based on measurements of power source characteristics.
2. Demonstrate the right choice of diode material, thyristors and inverters based on the understanding of the basic principles and methods for controllingthe volt-ampere characteristics of the electric welding machines.
3. Integrate the welding current, voltage, temperature, load and displacement using equipment's suchas clamp meter, LVDT, arc welding analyzer and resistance for welding quality monitoring.

SYNOPSIS

This course is aimed to provide the students with the understanding of static and dynamic characteristics ofthe electric arc and its associated power characteristics. Students will learn the basic principles, methods and circuit components that control operating power and the volt-ampere characteristics in electrical resistance and arc welding. Through that students will gain knowledge of the operating principles of Alternators, D.C. generators and motors used for welding.

REFERENCES

- WATERS, T. F. (2017). Fundamentals of manufacturing for engineers. Place of publication not identified: CRC Press.
- Abu Hassan Ismail. (1993). Kimpalan dan Potongan Gas : Manual Bengkel. IBS Buku. LC Call Number:
- TS227 .A38 1993.
- Groover, M. P. (2015). Fundamentals of Modern Manufacturing. Wiley.
- Kalpakjian, S., Schmid, S. R., & Sekar, K. S. (2016). Manufacturing: Engineering and technology. Melbourne, Victoria, Australia: Pearson Australia.
- Crowson, Richard. (2006), The Handbook of Manufacturing Engineering. Taylor and Francis. LC Call Number: TS183 .H36 2006 v.1

NON-DESTRUCTIVE TESTING/UJIAN TANPA MUSNAH (BMIK 2134)

LEARNING OUTCOMES

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

1. Explain the current basic and some advanced principles of Non-Destructive Testing (NDT) techniques to satisfy complex engineering problems.
2. Select and propose suitable NDT techniques based on their analysis on engineering problems that fulfil the standard practice.
3. Develop the ability to communicate effectively using available resources to disseminate knowledge of NDT techniques in relation with industrial problem.

SYNOPSIS

This course introduces the basic principles of non-destructive testing and the methods of non-destructive testing that are widely use in the industry, which are Visual Inspection, Penetrant Test, Magnetic Particle Testing, Eddy Current Testing, Ultrasonic Testing and Radiographic Testing. This course also covers the execution, evaluation and interpretation of each NDT techniques. The advantages, limitations and main application of each NDT techniques are also provided.

REFERENCES

- Nathan Ida, Norbert Meyendorf (2019). Handbookof Advanced Non-Destructive Evaluation -1st ed. Springer.
- Gerardus Blokdyk (2018). Nondestructive Testing - 3rd ed. 5STARCooks.
- R.S. Sharpe, J.West and D.S Dean (2017). Quality Tehcnology Handbook - 4th ed. Butterworth-Heinemann.
- F.P.G. Marquez, M. Papaelias, Noor Zaman (2016). Non-Destructive Testing. InTech Open.
- Wesley Davis (2015). Procedures and Applications of Nondestructive Testing. NY RESEARCH PRESS.

COMPUTER AIDED ANALYSIS/ ANALISIS BERPANDUKAN KOMPUTER (BMIK 2114)

LEARNING OUTCOMES

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

1. Analyse basic stress analysis for welding connection.
2. Apply fundamental sketching and feature modelling, build feature-based models of parts and assemblies for easy editing.
3. Produce document design intent of parts and assemblies (include weld design) in manufacturing drawings.

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 solid models and surface with emphasis on design intent. The students also will expose to the introduction to FEA structure/stress analysis, FEA application for weld product (welding connection analysis). The course includes hands-on exercises and best practice methods for students during drafting stage, part, assembly (weld product) and Finite Element Analysis (weld product)

REFERENCES

- Tickoo, P. , 2016, Catia V5-6R2015 For Designers, 13th Ed., CADCIM Technologies, USA.
- Dassault Systeme, 2008, CATIA: Part Design Fundamental, Generative structure analysis, generative assembly structure analysis, France.
- Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. and Novak, J. E., 2016, Technical Drawing, 15th Ed., Prentice Hall, New York.
- Jensen, C., and Helsel, J. D., Short, D.R., 2017, Engineering Drawing And Design, 7th Edition, Glencoe and McGraw Hill, India.

ECONOMIC OF WELDING AND PROCUREMENT/EKONOMI KIMPALAN DAN PEROLEHAN (BMIK 3144)

LEARNING OUTCOMES

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

1. Calculate welding costs that include machine, material and labour.
2. Suggest the effective costing and the factors influencing welding costs.
3. Record of transactions in jurnal and ledgers, trial-balance and preparation of final account.

SYNOPSIS

The aim of this course is to provide participants with a clear understanding of the principles of effective procurement by utilizing the capabilities to plan, implement, and evaluate a sourcing process appropriate to the value/ risk of the joining technology, materials/ part/ equipment being procured, communication and negotiation skills, and capacity to manage strategic supply, services and consultancy contracts. Besides to acquire knowledge in welding economics in the selection of process, consumables and workpiece materials.

REFERENCES

- L. P. Connor, (2016) Economics In Welding And Cutting, American Welding Society.
- Peter Baily, David Farmer, Varry Crocker, David Jessop, David Jones, (2015) Procurement Principles and management, Pearson.
- 3. R. Panneerselvam, (2008), Engineering Economics, Eastern Economy Edition.

WELDING QUALITY ASSURANCE/JAMINAN KUALITI KIMPALAN (BMIK 3224i)

LEARNING OUTCOMES

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

1. Design a plan for quality assurance and controlin welding manufacturing process according to specifications and standards.
2. Demonstrate the procedure and inspection techniques related to welding assurance and control.
3. Apply creative thinking in problem solving to solve the problems associated with welding assurance and control.

SYNOPSIS

This course provides students with knowledge related with welding quality assurance. They will be taught with various topics covering Introduction to Welding Quality Assurance, Quality System Management and Responsibilities, Quality Assurance Planning, Welding Quality Standards, Inspections and Tests, Statistical Process Control, Nonconformances and Corrective Actions, Preventive Actions, Quality Audits, Records and Documents Control.

REFERENCES

- Jay Heizer, Bery Render, Chuck Munson (2016). Operations Management: Sustainability and Supply Chain Management -12th Edition. Pearson.
- R.S. Sharpe, J.West and D.S Dean (2017). Quality Tehcnology Handbook - 4th ed. Butterworth-Heinemann.
- Kalpakjian, Schmid, Steven R. (2018). Manufacturing Engineering and Technology - 7th ed. Pearson India.
- William J Stevenson (2017). Operation Management - 13th ed. McGraw-Hill Education.

CYBER PHYSICAL SYSTEMS IN WELDING/ SISTEM FIZIKAL SIBER DALAM KIMPALAN (BMIK 3193)

LEARNING OUTCOMES

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

1. Justify the added value that can be achieved through application of CPS in welding process.
2. Demonstrate effectively the appropriate CPS tools in acquiring process variables in real time.
3. Criticise the logged data acquired from conventional and non-conventional welding techniques.

SYNOPSIS

The aim of this course is to provide participants with a clear understanding of the potential application of cyber- physical systems (CPS) in welding industry. Competency in applying CPS technology, both with standalone and built- in CPS in analysis of welding parameters (e.g. current, temperature) and welding outputs (e.g. fume composition, welding bead) is thought for improving the marketability of the graduates in the era industrial revolution 4.0.

REFERENCES

- Alur, R. (2015). Principles of cyber-physical systems. MIT Press.
- Jeschke, S., Brecher, C., Meisen, T., Özdemir, D., & Eschert, T. (2017). Industrial internet of things and cyber manufacturing systems. In Industrial Internet of Things (pp. 3-19). Springer, Cham.
- Pires, J. N., Loureiro, A., & Bölmsjo, G. (2006). Welding robots: technology, system issues and application. Springer Science & Business Media.

MANAGING PRODUCTION AND SUPERVISION/ PEMANTAUAN DAN PENGURUSAN PENGELUARAN (BMIK 3213i)

LEARNING OUTCOMES
Upon completion of this course, student should be able to:
1. Evaluate total welding process performance based on quality management system.
2. Perform planning, scheduling and control.
3. Propose solution for solving related supervision problem.

SYNOPSIS
Welding production planning is another very important element in manager's responsibility to allocate the resources required to achieve cost-effectiveness in welding processes. Furthermore, this subject shall cover manager's responsibility to maintain equipment and consistently meet throughput requirements with a level of quality that conforms to the required standards.

REFERENCES

- J.R. Barckhoff (2005), Total Welding Management, American Welding Society.
- Kerzner, H.R., (2017), Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 12th Ed. John Wiley & Sons Inc, USA.
- Cartlidge, D., (2015), Construction Project Manager's Pocket Book, 1st Ed. Routledge, USA.
- Fredrike Bannik, (2014), Handbook of Positive Supervision, Hogrefe Publishing.

WELDING REPAIR/ PEMBAIKAN KIMPALAN (BMIK 3204i)

LEARNING OUTCOMES
Upon completion of this course, student should be able to:
1. Extrapolate the repair welding skill and apply techno-economics for practical problems.
2. Demonstrate high quality of repair welding which will benefit the industry in term of productivity and savings.
3. Acquire the skills to carry out practical feasible repairtechniques maintaining low cost.

SYNOPSIS
The aim of this course is to acquire knowledge and to solve problems associated with failure and to update personal on the latest technology to ensure welded coursewould be maintained in good operating condition and at low maintenance cost.

REFERENCES

- Dobly R.E., Kent K.S., (1986) Repair and Reclamation, The Welding Institute.
- Jeffus, L. F. (2017). Welding: Principles and applications. Australia: Cengage Learning.
- Bowditch, W. A. (2018). Modern Welding. S.L.: Goodheart-Willcox.
- Lippold, J. C. (2015). Welding metallurgy and weldability. Hoboken, NJ: John Wiley & Sons.
- Welding inspection technology: Workbook. (2008). Miami, FL: American Welding Society, Education Services.

ELECTIVE COURSES BMIK

NON-DESTRUCTIVE TEST FOR PROFESSIONAL/ UJIAN TANPA MUSNAH UNTUK PROFESIONAL (BMIK 3154)

LEARNING OUTCOMES

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

1. Construct testing instruction and work planning.
2. Suggest the condition of welding based on the NDT signal.
3. Recommend the maintenance and calibration of the NDT equipment.

SYNOPSIS

This course covers the preparation for the certification in the selected NDT technology. Certification is important because NDT personnel need to make critical judgments that can have safety and/or significant financial consequences. Therefore, in this course elements of technology preparation, operation, planning, data collection and interpretation, and maintenance are being provided.

REFERENCES

- International Standard ISO 9712. New Technologies in Electromagnetic Non-destructive Testing, (2016), Songling Huang and Shen Wang.
- National Occupational Skill Standard, Department of skills Development. Non Destructive test, (2016), Fausto Pedro García Márquez, Mayorkinos Papaelias, Noor Zaman.
- Ultrasonic Methods of Non-destructive Testing, (1996), Jack Blitz and Geoff Simpson.
- Non-destructive Testing Techniques, (2009) Ravi Prakash.

WELDING TECHNOLOGY FOR PROFESSIONAL/ TEKNOLOGI KIMPALAN UNTUK PROFESSIONAL (BMIK 3164)

LEARNING OUTCOMES

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

1. Design a WPS and WPQT using according specifications and standards.
2. Develop the welding procedure based on knowledge related to weld techniques and position.
3. Suggest solution to the problems associated with welding qualification.

SYNOPSIS

This course provides students with knowledges and skills related with welding technology. They will be taught with various topics covering Introduction to Welder Certification Scheme, Welding Processes and Procedures, Welding Codes and Standards, Welding Procedure specification (WPS), Welding Procedure Qualification Test (WPQT), Pre and Post-Weld Inspection, Reports and Documentations and Welder Qualification Training and Testing (WQT).

REFERENCES

- Gower A. Kennedy, 2012, Welding Technology, 5th Ed. Howard W. Sams., Prentice Hall.
- O.P. Khanna, 2015 A text Book of Welding Technology, 1st edition, Dhanpat Rai Publication.
- Larry Jeffus, 2017, Welding Principles and Application, 8th edition, sense publication.

BMIK 3174
WELDING INSPECTION FOR PROFESIONAL/ PEMERIKSAAN KIMPALAN UNTUK PROFESSIONAL

LEARNING OUTCOMES

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

1. Explain the duties and responsibilities of a welding inspector including fusion welding processes, typical weld defects, types of steel (including carbon-manganese, low alloy and stainless steels), the hardening of steels, weldability, heat treatment, and parent metal defects.
2. Develop procedure for approval based on codes and standards, and an outline of safe working practice.
3. Justify the test requirement of visual inspection, the testing of parent metals and welds, and destructive and non-destructive test techniques.

SYNOPSIS

This course will teach the duties and responsibilities of a welding inspector including fusion welding processes, typical weld defects, types of steel (including carbon- manganese, low alloy and stainless (including carbon- manganese, low alloy and stainless steels), the hardeningof steels, weldability, heat treatment, and parent metal defects. The course also includes visual inspection, the testing of parent metals and welds, and destructive and non- destructive test techniques. It is also learnt in the course about welder and procedure approval, codes and standards, and an outline of safe working practices.

REFERENCES

- Hughes, S. E. (2009). A Quick Guide to Welding and Weld Inspection. Amer Society of Mechanical.
- Welding inspection technology. (2008). Miami, FL: American Welding Society, Education Dept.
- Gower A. Kennedy, 2012, Welding Technology, 5th Ed. Howard W. Sams., Prentice Hall.
- O.P. Khanna, 2015 A text Book of Welding Technology, 1st edition, Dhanpat Rai Publication.
- Larry Jeffus, 2017, Welding Principles and Application,8th edition, sense publication

BMIK 3114
UNDERWATER WELDING AND INSPECTION FOR PROFESIONAL/ KIMPALAN DALAM AIR DAN PEMERIKSAAN KIMPALAN UNTUK PROFESSIONAL

LEARNING OUTCOMES

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

1. Interpret safe commercial diving procedures, risk assessment, and emergency response for underwater welding operations.
2. Perform underwater welding, cutting, and preparation techniques to industry competency standards under supervised conditions.
3. Demonstrate in-water NDT inspection following accepted inspection practices.

SYNOPSIS

This course provides undergraduate engineering students with a comprehensive foundation in underwater welding processes, non-destructive testing (NDT), and subsea inspection practices. The curriculum is structured around internationally recognised standards (EN ISO 15618-1, ISO/TC 44/SC 15) and is designed to prepare students for industry certification pathways including CSWIP 3.1U/3.2U, IMCA/ADCI accreditation, and TWI/PCN NDT qualifications. The course is competency-based, with the majority of time devoted to hands-on pool welding, NDT laboratories, simulated hyperbaric environments, and an integrated field exercise, ensuring graduates are industry-ready.

REFERENCES

- Grubbs, R. (2010). Underwater Cutting & Welding Manual. Cornell Maritime Press.
- AWS (2016). AWS D3.6M: Specification for Underwater Welding. American Welding Society.
- Woodson, R. D. (2009). Welding Fundamentals (2nd ed.). McGraw-Hill.
- Alber, J. (2008). Underwater Welding – Theory and Practice. TWI Ltd.

CORROSION AND SURFACE PROTECTION FOR PROFESSIONAL/ KAKISAN DAN PERLINDUNGAN PERMUKAAN UNTUK PROFESSIONAL (BMIK 3124)

LEARNING OUTCOMES

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

1. Explain corrosion types and mechanisms affecting welded joints, weld metal, heat-affected zones, and base metal.
2. Develop corrosion-control and surface-protection procedures in accordance with relevant codes, standards, and safe working practices.
3. Recommend corrosion-prevention measures in welding fabrication through appropriate joint design, material selection, weld quality control, and post-weld treatment.

SYNOPSIS

This course introduces the students to corrosion types and mechanisms which affect welded structures and the methods used to prevent or reduce damage. The course covers corrosion types, welding-related factors that influence corrosion, surface preparation, protective coatings, cathodic protection, and relevant codes, standards, and safety practices. The subject emphasizes practical application in welding and fabrication work, including weld inspection, failure analysis, and selection of appropriate protection methods for industrial components such as pipelines, tanks, steel structures, and pressure vessels. It prepares students to apply corrosion control principles to improve the durability, safety, and performance of welded products.

REFERENCES

- Stephen D. Cramer; Bernard S. Covino, Jr. (2003), Corrosion: Fundamentals, Testing, and Protection, Volume 13A, ASM Handbook
- Davis, J. R. (Ed.). (2006). Corrosion of weldments. ASM International
- Jones, D. A. (2013). Principles and prevention of corrosion (2nd ed.). Pearson.
- Weber, T. V. (n.d.). The practical reference guide for corrosion of welds: Causes and cures. SAE International.
- American Petroleum Institute. (n.d.). Mechanical integrity: Corrosion control and inspection standards
- NACE International. (n.d.). NACE corrosion engineer’s reference book.

PAINTING AND BLASTING FOR PROFESSIONAL FOR PROFESIONAL/ PENGECATAN PEMBERSIHAN PERMUKAAN ABRASIF UNTUK PROFESSIONAL (BMIK 3194)

LEARNING OUTCOMES

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

1. Explain the fundamental principles of surface preparation, abrasive blasting, coating systems, and coating application methods used in industrial protective coating practice.
2. Perform surface preparation, coating application, and coating inspection/testing procedures using standard tools and techniques to solve practical blasting and painting problems.
3. Demonstrate professional, safe, and ethical work practices, including HSE compliance and teamwork, and communicate inspection findings effectively in written reports during blasting and painting operations.

SYNOPSIS

This course introduces students to the principles, materials, methods, and quality control procedures used in industrial surface preparation (blasting) and protective coating (painting) of metallic structures. Emphasis is placed on surface preparation standards, coating systems and selection, application techniques, inspection and testing equipment Students will gain hands-on laboratory exposure to abrasive blast cleaning, hand/power tool cleaning, coating application, and coating inspection instrumentation, preparing them for roles in fabrication, marine, oil & gas, and structural steel industries.

REFERENCES

- Rizzo, Mario Bruno, Giuseppe, (2009), Surface coatings, New York, NY Nova Science.
- Philip A. Schweitzer. (2006) Paint and Coatings Applications and Corrosion Resistance, Boca Raton, FL CRC/Taylor & Francis.
- Joseph V. Koleske, (2012), Paint and Coating Testing Manual, 15th Edition, West Conshohocken, PA ASTM International.
- Rointan F. Bunshah, (2001) Handbook of hard coatings deposition technologies, properties and applications, Norwich, NY Noyes Publication.
- PETRONAS Technical Standard PTS 15.20.03, Protective Coatings and Linings, February 2016
- NACE International, Coating Inspector Program (CIP) Level 2 Student Manual, July 2011

PROGRAM CORE COURSES BMIM

PRODUCT DRAFTING AND SPECIFICATION/ DRAF PRODUK DAN SPESIFIKASI (BMIM 1013)

LEARNING OUTCOMES

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

1. Examine, analyse, interpret and assess the engineering drawing.
2. Deliver information via the set of drawings from engineering parts.
3. Draft the product to be machined according to the standard of engineering drawing.

SYNOPSIS

The course will provide students with an understanding of the importance of engineering graphics as a communication tool specially for machining applications. Students willbe exposed to geometry drawing, orthographic drawing, section view, isometric drawing, assembly drawing, dimension, tolerance, machining symbol and standard codes using manual sketches and computer aided design (CAD) software. They also learn how to interpret drawings.

REFERENCES

- Mechanical Drawing Board & CAD Techniques, Student Edition, McGraw-Hill Education, 2013.
- Dix, M. & Riley, P., 2014, Discovering AutoCAD 2017 Prentice Hall, New York.
- 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.
- Jensen, C., & Jay D. H., 2007, Engineering Drawing and Design, 7th Ed., Glencoe and McGraw Hill, New York.
- James D. Bethune, 2018, Engineering Graphics with AutoCAD 2017, Prentice Hall.

STANDARD PRODUCT PRECISION/ KETEPATAN PIAWAI PRODUK (BMIM 1023)

LEARNING OUTCOMES

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

1. Conduct the basic quality principles and practices, quality solving techniques and product reliability related to manufacturing process.
2. Perform suitable measurement methods for a given issue.
3. Solve the manufacturing process quality problem using quality solving techniques as individual or groupwork.

SYNOPSIS

This course covers three main areas: dimensional metrology, measurement analysis, and surface/texture measurement. In the dimensional metrology, students willbe expose to three types of measurements: linear, angle and geometrical. 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. This course equivalent to Geometric, Dimensioning and Tolerance in other technological fields.

REFERENCES

- Bucher, J.L (2014). The Metrology Handbook. ASQ Quality Press.
- Campbell, R.G and Roth, E.S (2012). Integrated Product Design and Manufacturing Using Geometrical Dimensioning and Tolerancing. Marcel Dekker, Inc.
- Besterfield, D. H. (2014) Quality Control, 8th Edition, Pearson.
- Montgomery D. C. (2005). Introduction to StatisticalQuality Control, 5th Edition, John Wiley and Sons, Inc.
- Bass, I (2014) Six Sigma Statistic with Excel andMinitab, Mc Graw Hill.
- Pande, Sanjay S., Dixit, Uday Shanker (2016).Precision Product-Process Design and Optimization.

WORKPIECE AND CUTTIING TOOL PROPERTIES/ SIFAT BAHAN KERJA DAN PERKAKAS PEMOTONG (BMIM 1033)

LEARNING OUTCOMES

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

1. Recognize the common cutting tools and workpiece material that being applied in the automotive, aerospace and medical industries.
2. Manufacture cutting tool and/or workpiece material from powder metallurgy and casting process.
3. Relate the usage of cutting tools and workpiece materials in the specific application in industry.

SYNOPSIS

This course covers types, setup, applications and specifications of common cutting tools and workpiece materials that frequently applied in industry. The course also introduces why the selection of the appropriate cutting tools and cutting fluids are essential in metal cutting operations to reduce the heat and friction produced during material removal operations and how the selection, setup and applications affect the quality, accuracy, efficiency and productivity of the workpiece produced.

REFERENCES

- Erik Oberg, Franklin Jones, Holbrook Horton, Henry Ryffel, Christopher McCauley, (2016) 30th Edition, Machinery's Handbook, Industrial Press.
- Winston A. Knight, Geoffrey Boothroyd, (2005) 3rd Edition, Fundamentals of Metal Machining and Machine Tools. Taylor & Francis.
- J. Paulo Davim, (2014) 1st Edition, Machinability of Advanced Materials, Wiley.
- J. Paulo Davim, (2011) 1st Edition, Machining of Hard Materials, Springer.
- A Mouritz, (2012) 1st Edition, Introduction to Aerospace Materials, Woodhead Publishing.

JIG AND FIXTURE/ JIG DAN LEKAPAN (BMIM 1043)

LEARNING OUTCOMES

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

1. Recognize difference type of jigs and fixtures, materials used, actuation method, components of jigs and fixtures.
2. Perform to fabricate component for jig and fixture with the specific design and application in manufacturing process.
3. Coordinate a task to fabricate jig and fixture assembled by multi components application.

SYNOPSIS

This course introduces students to jig and fixture. It starts with types and functions of jig and fixture. In addition, students will be exposed to knowledge about classification of jig and fixture for selected operation. This course also will introduce students to identify the principles and analysis of a tool design in jig and fixture application. In this course, the tool drawing is important to students in order to design the jig and fixture therefore the guideline oftool and jig design are explained.

REFERENCES

- P. H Joshi (2010). Jig and Fixtures, Third Edition. McGraw Hill Education.
- Tool and Cutter Sharpening (Workshop Practice), Harold Hall, Special Interest Model Books; UK ed. Edition, 2012.
- Grover, M.P. (2010). Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 4th Edition. Wiley.

TOOL SETUP AND REFURBISHMENT/ PEMASANGAN DAN BAIKPULIH PERKAKAS (BMIM 1054)

LEARNING OUTCOMES

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

1. Identify the importance specification of cutting tool design for turning, milling and drilling operations.
2. Perform the cutting tool setup for turning, milling and drilling operations.
3. Propose the usage of refurbished cutting tools in machining and other application.

SYNOPSIS

This course covers types, setup, applications and specifications of common cutting tools and workpiece materials that frequently applied in industry. The course also introduces why the selection of the appropriate cutting tools and cutting fluids are essential in metal cutting operations to reduce the heat and friction produced during material removal operations and how the selection, setup and applications affect the quality, accuracy, efficiency and productivity of the workpiece produced.

REFERENCES

- Tool and Cutter Sharpening (Workshop Practice), Harold Hall, Special Interest Model Books; UK ed. Edition, 2012.
- Kalpakjian, S. and Schmid R. (2014), Manufacturing Engineering and Technology, 7th Edition, Prentice Hall.
- Mikell P. Groover, Fundamentals of Modern Manufacturing Materials, Processes, and Systems, 4th Edition, John Wiley & Sons, 2010.
- Mikell P. Groover, Principles of Modern Manufacturing SI Version, 5th Edition, John Wiley & Sons, 2013.
- Metal Cutting Theory and Practice-CRC Press (2016), Agapiou, John S. & Stephenson, David A.
- Tool and Cutter Grinding, Crowood Press Ltd (2021)
- - Marcus Bowman.

SUSTAINABLE MACHINING/ KELESTARIAN PEMESINAN (BMIM 1063)

LEARNING OUTCOMES

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

1. Recognize the concept of green manufacturing and sustainability in machining practices.
2. Evaluate the principles and sustainability of using minimum resources for cost and energy saving.
3. Relate the sustainable issues and acts in machining industry.

SYNOPSIS

This course provides an overview on current sustainable machining. Its topics cover the concept in cutting tool management, lubrication strategy, optimization, economic, environmental dimensions. The course also covers design of experiment in machining trials.

REFERENCES

- J. Paulo Davim, Sustainable Machining, 2017, Springer.
- Peralta Álvarez M, Marcos Bárcena M, Aguayo González F. A Review of Sustainable Machining Engineering. 2016.
- Optimization Process Through Triple Bottom Line. ASME. J. Manuf. Sci. Eng. 2016. 138(10):100801-100801-16. doi:10.1115/1.4034277.

CONDITION MONITORING IN MACHINING/ PEMANTAUAN KEADAAN DALAM PEMESINAN (BMIM 1073)

LEARNING OUTCOMES

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

1. Relate the application of design, maintenance, process and inspection in condition monitoring.
2. Elaborate the potential of machining experts in condition monitoring.
3. Develop on skills that required to be applied in condition monitoring.

SYNOPSIS

This course exposes the student in performing condition monitoring is the process of determining the condition of machinery while in operation. It can be categorized into three aspects: Knowing what to listen for; How to interpret it; when to put this knowledge to use. Understandingthis course enables to repair of problem components prior to failure. Condition monitoring not only helps plant personnel reduce the possibility of catastrophic failure,but also allows them to order parts in advance, schedule manpower, and plan other repairs during the downtime.

REFERENCES

- BS ISO 13372: "Condition monitoring and diagnostics of machines. Vocabulary" (2012).
- ISO (2011). ISO 17359:2011, Condition monitoring and diagnostics of machines - General guidelines. The International Organization for Standardization
- (ISO).
- Simon R. W. Mills (2010). Vibration Monitoring and Analysis Handbook - (INST397). The British Institute of Non-Destructive Testing. ISBN 978-0-903132-39-8.
- Principles of Machine Operation and Maintenance By Dick Jeffrey Copyright Year 1991.

ASSESMENT OF MACHINABILITY/ PENILAIAN KEBOLEHMESINAN (BMIM 1083)

LEARNING OUTCOMES

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

1. Define factors that is governed or influenced on the machinability.
2. Measure the machinability of machining process.
3. Organizing various methods of improvement for machinability.

SYNOPSIS

This course provides the students on knowledge for machinability measurement of material. Machinability is an indicator on how material can be cut (machined) permitting the removal of the material to achieve acceptable performances. Materials with good machinability (free machining materials) require little power to cut, can be cut quickly, easily obtain a good finish, and do not wear the tooling much. The factors that typically improve amaterial's performance often degrade its machinability. Therefore, to manufacture components economically, engineers are challenged to find ways to improve machinability without harming performance. Machinability can be difficult to predict because machining has so many variables. Two sets of factors are the condition of work materials and the physical properties of work materials. The condition of the work material includes eight factors: microstructure, grain size, heat treatment, chemical composition, fabrication, hardness, yield strength, and tensile strength. Physical properties are those of the individual material groups, such as the modulus of elasticity, thermal conductivity, thermal expansion, and work hardening. Other important factors are operating conditions, cutting tool material and geometry, and the machining process parameter.

REFERENCES

- Erik Oberg, Franklin Jones, Holbrook Horton, Henry Ryffel, Christopher McCauley, (2016) 30th Edition, Machinery's Handbook, Industrial Press, 2014.
- Winston A. Knight, Geoffrey Boothroyd, (2005) 3rd Edition, Fundamentals of Metal Machining and Machine Tools, Taylor & Francis, 2012.
- J. Paulo Davim, (2014) 1st Edition, Machinability of Advanced Materials, Wiley.
- B Mills and A H Redford, (1983) 1st Edition, Machinability of Engineering Materials, Springer.

PRECISION AND FINISING IN CNC TECHNOLOGIES/ KETEPATAN DAN KEMASAN DALAM TEKNOLOGI CNC (BMIM 2094)

LEARNING OUTCOMES

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

1. Recognize the capabilities of 2, 3 axis CNC machining.
2. Develop programs by using a coordinate system for milling and turning by using an ISO coding system.
3. Manage production by using CNC machines to produce components.

SYNOPSIS

This course provides students with concepts and practices in CNC machining that are computer programming ofCNC milling and turning with specific processes such as drilling, tapping, boring, grooving, facing, pocketing, radius forming, angular cutting, and threading. Emphasis is on programming and production of parts including investigation in 2 and 3-axis programming techniques.

REFERENCES

- J.L. Stauffer, (1993) Finishing Systems design & Implementation, Published by association of Finishing process of the Society of Manufacturing Engineers Practical CNC-Training for planning and shop-Hanser Publishers. 1998.
- Introduction to Computer Numerical Control-Barry Leathem-Jon. 1986.

PRECISION AND FINISHING IN EDM AND GRINDING TECHNOLOGIES/ KETEPATAN DAN KEMASAN DALAM TEKNOLOGIEDM DAN PENGISARAN (BMIM 2103)

LEARNING OUTCOMES

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

1. Recognize the capabilities of EDM and Grinding Processes.
2. Develop programs using a coordinate system for EDM and Grinding machining solutions.
3. Manage production using EDM and Grinding machines to produce components.

SYNOPSIS

This course introduces students to EDM and grinding technologies. It starts with the introduction of EDM and grinding technologies. In addition, students will be exposed to knowledge about classification of EDM and grinding technologies for selected operation. This course also will introduce students to identify the principles and analysis of a tool design and tool manufactured in both machine applications. In this course, the tool drawing is important to students in order to operate and manage the machine in the laboratory. The content in this lesson plan will guidethe lecturer on the presentation.

REFERENCES

- J.L. Stauffer, (1993) Finishing Systems design & Implementation, Published by association of Finishing process of the Society of Manufacturing Engineers (SME).
- Tool and Cutter Sharpening (Workshop Practice), Harold Hall, Special Interest Model Books; UK ed. Edition, 2012. The electrical discharge machining (EDM) handbook.
- K. P. Rajurkar. B. Zhang, 2007. Principles of Modern Grinding Technology Book, Second Edition. W. Brian Rowe. 2014.

PRISMATIC CADCAM PRODUCT/ PRODUK CADCAM PRISMATIK (BMIM 2114)

LEARNING OUTCOMES

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

- Design the product by using the CAD/CAM system.
- Apply the method of converting CADCAM design tothe CNC programs.
- Manage the different procedures in NC programming.

SYNOPSIS

This course is an introducing to the CAD/CAM system and its application in industry. It covers completeintegration of design and manufacturing simplifies the creation of manufacturing components and geometry. The topics involved feature-based and geometry-based programming, for easy adaptability to design changes. Students will practice predictable and reliable machining to accelerate delivery of products to customers. This course provides a complete solution, from design through NC codegeneration, NC program creation, process documentation, post-processing and toolpath verification and simulation.

REFERENCES

- Fred Karam, Using CATIA V5, Tomson (DelmaLearning), 2014.
- P N Rao, CAD/CAM Principles and Applications, 2ndEdition, McGraw Hill, 2004.
- Chang T.C., Richard A. Wysk, Wang H.P., Computer-Aided Manufacturing, 2nd Edition,
- Prentice Hall, 2006.

MULTI AXIS MACHINING/ PEMESINAN PELBAGAI PAKSI (BMIM 2123)

LEARNING OUTCOMES

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

1. Create machining program for complex parts that require multi axis machining.
2. Differentiate different types of machine configuration and machine kinematics.
3. Present sources and possibility of machine collision during machining.

SYNOPSIS

This course gives in depth knowledge to students regarding multi axis machining. As compared to basic CNC machining which comprises of 3 linear axes namely X, Y and Z axis, multi axis machining gives further capability to machine complex parts with the additional rotary axis A, B and C as well as mill-turn and turn-mill capability. Understanding machines configuration will be key to avoid collision during machining. Students will be introduced to different types of machine configuration and machine kinematics to have better understanding of machine tools in order to create effective and safe CNC machining programs.

REFERENCES

- CNC Machining Handbook: Building, Programming, and Implementation by Alan Overby, Publisher: McGraw-Hill Education TAB, Release Date: October 2010.
- Secrets of 5-axis Machining, Karlo Apro, Industrial Press, Inc New York, 2008.

COMPLEX CADCAM PRODUCT/PRODUK CADCAM KOMPLEKS (BMIM 2134)

LEARNING OUTCOMES

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

1. Distinguish the different procedures in NC programming for complex product.
2. Apply the method of converting to the CNC programs.
3. Develop the geometric features and method to design complex CAD/CAM part.

SYNOPSIS

This course is the continuity from the course of Prismatic CADCAM Product. Complex CADCAM product will be produced by using either 3, 5 or 9 axis CNC machines. The topics involved with construction views; cross section surface construction; trim plane surface; extruded surface; surface of revolution; drive curve surface construction; surface fillet construction; extending surface; composite surface construction.

REFERENCES

- Fred Karam, Using CATIA V5, Tomson (Delma Learning), 2014.
- P N Rao, CAD/CAM Principles and Applications, 2nd Edition, McGraw Hill, 2004.
- Chang T.C., Richard A. Wysk, Wang H.P., Computer-Aided Manufacturing, 2nd Edition, Prentice Hall, 2006.

HEAT TREATMENT OF THE MACHINED COMPONENTS/ RAWATAN HABA UNTUK KOMPONEN TERMESIN (BMIM 2143)

LEARNING OUTCOMES

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

1. Conduct heat treatment to alter the properties of selected steel.
2. Differentiate the heat treatment application to change the properties of material.
3. Present the capability heat treated steel to be apllied in other application.

SYNOPSIS

This course will discuss the concept and application of heat treatment on various types of metal. The topics involved with the types of heat treatment process, main alloying element that affected the hardenability of steel and the change of microstructure and mechanical properties. The students will be exposed to the common heat treatment practice in industry. Student will also practice the quality control evaluation after heat treatment. Several advanced heat treatment process also will be discussed.

REFERENCES

- Totten, G.E., 2010. Steel heat treatment: metallurgy and technologies. CRC Press.
- Sharma, R.C., 2008. Principles of heat treatment of steels. New Age International.
- O. Erik, 2017. Heat Treatment of Steel. Read Book Ltd

ASSEMBLY METHOD/ TEKNIK PEMASANGAN (BMIM 2154)

LEARNING OUTCOMES

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

1. Develop of product by assembly component manufacture various technique.
2. Present the possibility to assemble components by using various techniques.
3. Organize the components that can be assembled by design for manufacturing assembly (DMFA) approach.

SYNOPSIS

This course introduces students to assembly method. It starts with types and functions of joining techniques in metal and plastic part. In addition, students will be exposed to knowledge about process assembly for metal and plastic parts. This course also will introduce student to design for manufacturing and assembly application. In this course, the principle of assembly method is important to students in order to design effectively step by step of assembly.

REFERENCES

- Geoffrey Boothroyd, Peter Dewhurst, Winston Knight. Product Design for Manufacture and Assembly (Manufacturing Engineering and Materials Processing) 3rd Edition, 2011. ISBN: 10.1420089277/ ISBN:13.9781420089271.
- Lanxess, A Design Guide, Joining Techniques in Engineering Plastics, Joining Techniques. 2010.

REWORK AND RESTORATION OF MACHINED COMPONENT / PEMBAIKAN DAN PEMULIHAN KOMPONEN MESIN (BMIM 3224)

LEARNING OUTCOMES

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

1. Identify parts that can be reworked or rehabilitated.
2. Propose the methods and procedures that can be utilized for rework and rehabilitation process.
3. Verify whether reworked or rehabilitated parts are ready for use.

SYNOPSIS

This course gives an exposure on rework of machined part and rehabilitating machined components whichare out of tolerance due to wear and tear. Rework are required when machined parts are under machined and still have unremoved materials due to tool wear during machining. Whereas rehabilitation of parts is required when a machined part is out of tolerance after servicing its purpose in the field. Students will gain understanding of rework and rehabilitation and be aware of its purposes in the field of manufacturing.

REFERENCES

- Handbook of Mould, Tool and Die Repair Welding, 1st Edition, S Thompson, 2010.

SURFACE AESTHETICS OF MACHINED COMPONENT/ ESTETIKA PERMUKAAN UNTUK KOMPONEN (BMIM 3224)

LEARNING OUTCOMES

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

1. Propose the suitable surface treatment process for suitable application.
2. Organize process to be applied to treat the surface from machining to coating process.
3. Present the benefit of fine surface finish of machined component to reduce operational cost.

SYNOPSIS

This course covers various types of coating method for performance and aesthetics purposes of machined component. It covers the fundamental of coating technologies, testing and procedures of each coating method.

REFERENCES

- Tracton, A.A. ed., 2010. Coating Technology: Fundamentals, Testing, and Processing Techniques. CRC Press.
- Kalpakjian, S., Vijai Sekar, K.S. and Schmid, S.R., 2014. Manufacturing engineering and technology. Pearson.

MACHINE MAINTENANCE/ PENYELENGGARAAN MESIN (BMIM 3234i)

LEARNING OUTCOMES

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

1. Present the different techniques in machine maintenance.
2. Propose preventive maintenance program with consideration of cost, manpower and time.
3. Demonstrate problem solving of real-life condition regards to machine maintenance issues.

SYNOPSIS

The student will be exposed to the maintenance technique, 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 also learn about troubleshooting and maintenance of various machines and components such as valve, pump, compressor, gear etc. The essential steps of disassemble, check, trouble-shoot, repair and reassemble of mechanical components will be stressed in this course.

REFERENCES

- Daniel E., Whitney, 2012, Mechanical Assemblies: Their Design, Manufacture and Role in Product Development, Oxford University Press.
- Joel Levitt, 2010, Tpm Reloaded: Total Productive Maintenance, 1st Edition, Industrial Press.
- Smith, Ricky, And Bruce Hawkins. Lean Maintenance: Reduce Costs, Improve Quality, And Increase Market Share. Amsterdam: Elsevier Butterworth Heinemann, 2004.

PROJECT MANAGEMENT AND SUPERVISION / PENGURUSAN PROJEK DAN PENYELIAAN (BMIM 3243i)

LEARNING OUTCOMES

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

1. Present the case study that exhibit excellent project manager.
2. Analyzing the main factors influencing project management outcome with consideration of professionalism and ethics.
3. Develop project management skills through theoretical understanding and practical application of the project management principles.

SYNOPSIS

This course provides a systematic and thorough introduction to all aspects of project management and supervision. Projects are an increasingly important aspect of modern business, so we begin with the relation between projects and the strategic goals of the organization. This course covers the technical, cultural, and interpersonal skills necessary to successfully manage projects fromstart to finish. The course emphasizes that manufacturing project management with its own tools, body of knowledge, and skills.

REFERENCES

- Project Management Institute, A Guide to the Project Management Body of Knowledge: (PMBOK® Guide) Sixth edition, PMI, 2018, ISBN 9781628253825.
- Frame, J. Davidson, Managing Projects in Organizations: How to Make the Best Use of Time, Techniques, and People, 3rd edition, Jossey-Bass, 2003, ISBN 0-787-96831-5.
- Project Management Institute, The Standard for Program Management, Third Edition, Project Management Institute, 2013, ISBN 978-1935589686.
- Stackpole, Cynthia Snyder, A Project Manager's Book of Forms: A Companion to the PMBOK® Guide, Wiley, 2009, ISBN 978-0470389843.
- Weiss, Joseph and Wysocki, Robert, Five-phase Project Management: A Practical Planning and Implementation Guide, Basic Books, 1992, ISBN 0-201-56316-9.

ACTS AND RISKS ASSESSMENT IN MACHINING PRODUCTION/ AKTA DAN PENILAIAN RISIKO DALAM PENGELUARAN PEMESINAN (BMIM 3253i)

LEARNING OUTCOMES

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

1. Be able to assess, analyse and interpret risks to the health and safety.
2. Able to plan, organise, control, monitor and review the preventive and protective measures.
3. Implementing operational risk management (ORM).

SYNOPSIS

This course teaches students the about health and safety and work in safer and healthier ways. student will be exposed with the related act. 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.

REFERENCES

- FAA System Safety Handbook, Health and safety in engineering workshops, 2010.
- Serope Kalpakjian and Steven R Schmid, K. Manufacturing Engineering and Technology 7th Edition. Pearson Education, 2016. ISBN-13: 978-0133128741/ISBN-10: 0133128741.

ELECTIVE COURSES BMIM

AEROSPACE MACHINING/ PEMESINAN AEROANGKASA (BMIM 3184)

LEARNING OUTCOMES

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

1. Relate the profession of design, maintenance, process and inspection in the aerospace industry.
2. Elaborate the potential of machining experts in the aerospace industry.
3. Develop on characteristics that can be adapted in the aerospace industry.

SYNOPSIS

This course provides students with advanced concepts and practices in CNC machining that are advanced computer programming of CNC milling and turning specific for aerospace machining processes such as profiling, drilling, boring, grooving, facing and threading. Emphasis is on programming and production of complex aerospace parts including investigation in 3, 4 and 5-axis programming techniques, utilizing canned cycles, macros (subroutines), looping and parametric programming. The uses of CAM in producing complex and efficient programming techniques are also covered.

REFERENCES

- Erik Oberg, Franklin Jones, Holbrook Horton, Henry Ryffel, Christopher McCauley, (2016) 30th Edition, Machinery's Handbook, Industrial Press.
- Winston A. Knight, Geoffrey Boothroyd, (2005) 3rd Edition, Fundamentals of Metal Machining and Machine Tools, Taylor & Francis J. Paulo Davim, (2014) 1st Edition, Machinability of Advanced Materials, Wiley.
- J. Paulo Davim, (2011) 1st Edition, Machining of Hard Materials, Springer.
- A. Mouritz, (2012) 1st Edition, Introduction to Aerospace Materials, Woodhead Publishing.

HUMAN FACTOR TECHNOLOGY/ TEKNOLOGI FAKTOR KEMANUSIAAN (BMIM 3194)

LEARNING OUTCOMES

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

1. Relate the profession of design, maintenance, process and inspection in the human factor technology.
2. Elaborate the potential of machining experts in the human factor technology.
3. Develop on characteristics that can be adapted in the human factor technology.

SYNOPSIS

This course provides human factor technologies pertinent to machine building particularly on ergonomic issues. Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well- being and overall system performance. Ergonomists in machining contribute to the design and evaluation of tasks, jobs, products, environments and systems in order to make them compatible with the needs, abilities and limitations of a machinist.

REFERENCES

- Tewari, P. C. (2017). Work study and ergonomics. Boca Raton: CRC Press.
- Shorrock, S. T., & Williams, C. (2017). Human factors and ergonomics in practice: Improving system performance and human well-being in the real world. Boca Raton: CRC Press Taylor & Francis Group.
- Bridger, R. S. (2018). Introduction to human factors and ergonomics. Boca Raton, FL: CRC Press, Taylor & Francis Group.

PRODUCTION PLANNING IN MACHINING/ PERANCANGAN PENGELUARAN DALAM PEMESINAN (BMIM 3204)

LEARNING OUTCOMES

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

1. Relate the profession of design, maintenance, process and inspection in the production planning.
2. Elaborate the potential of machining experts in the production planning.
3. Develop on characteristics that can be adapted in the production planning.

SYNOPSIS

The process planning in machining is basically a plan of how the designed parts will be fabricated, machine and equipment selection, to achieve required specification. It involves proper and strategic decisions along with analysis in order to plan and adapt the production of every single component that will be built. This course intent to provide substantial knowledge on production planning in machining. The course covers from the philosophy of process and machining engineering, methods of production planning, and up until production planning practices.

REFERENCES

- Manjuri Hazarika, Uday Shanker Dixit. (2014). Setup Planning for Machining: Springer.
- LaRoux K. Gillespie. (2017). Design for Advanced Manufacturing: Technologies and Processes: McGraw Hill Professional.
- Yousef Haik, Sangarappillai Sivaloganathan, Tamer
- M. Shahin. (2015). Engineering Design Process. Cengage Learning.

RAPID MACHINING/ PEMESINAN PANTAS (BMIM 3174)

LEARNING OUTCOMES

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

1. Relate the profession of design, maintenance, process and inspection in the rapid machining.
2. Elaborate the potential of machining experts in the rapid machining.
3. Develop on characteristics that can be adapted in the rapid machining.

SYNOPSIS

The course will introduce the concepts of Rapid Machining (RM). It covers the knowledge on materials as workpiece, cutting tools, cutting conditions and machines used inthe RM. Instead of that, students will learn to develop CNC programming for RM and also analyse the cutting performance of RM.

REFERENCES

- King, R., 2013. Handbook of high-speed machining technology. Springer Science & Business Media.
- El-Hofy, H.A.G., 2013. Fundamentals of machining processes: conventional and nonconventional processes. CRC press.

TOOL AND DIE MAKING/ PEMBUATAN PERKAKAS DAN DAI (BMIM 3164)

LEARNING OUTCOMES

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

1. Relate the profession of design, maintenance, process and inspection in the tool and die making.
2. Elaborate the potential of machining experts in the tool and die making.
3. Develop on characteristics that can be adapted in the tool and die making.

SYNOPSIS

This course introduces students to tool and die making. It starts with introduction about press machine. Further, students will be exposed to the knowledge about elements of progressive combination and compound dies. This course also introduces to student how to identify the principles and analysis of a mould. Finally, student will be explained the design considerations in design tool, mould and die.

REFERENCES

- Injection Moulding Machine-Parameters and Product Improvement Guideline, Abd. Kahar Nordin, Norfauzi Tamin, Mohd Hadzley Abu Bakar, Penerbit UTeM2019, ISBN: 978-967-2145-42-4.
- Tool and Cutter Sharpening (Workshop Practice), Harold Hall, Special Interest Model Books; UK ed. Edition, 2006.

COMPULSORY UNIVERSITY COURSES

- English Courses
- National Language and International Language Courses
- Co-Curricular Courses
- Human Skills Development Courses
- General Elective Courses

ENGLISH COURSES

ENGLISH FOR ACADEMIC PURPOSES (BLLW 1142)

Course Learning Outcome

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

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

ACADEMIC WRITING (BLLW 2152)

Course Learning Outcome

① Prepare clear and detailed descriptions of a product related to fields of interest.
② Express 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.

Pre-Requisite

BLLW1142

References

- Chazal, E.d. & Rogers, L. (2012). Oxford EAP: A course in English for Academic Purposes. New York: Oxford University Press.
- Hancock, M. & McDonald, A. (2010). English Result Upper-intermediate. New York: Oxford University Press.
- Paterson, K. & Wedge, R. (2013). Oxford Grammar for EAP. UK: Oxford University Press.

BLLW 3162 ENGLISH FOR PROFESSIONAL INTERACTION/ BAHASA INGGERIS UNTUK INTERAKSI

Course 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 communicationskills and strategies. Among the elements covered are professional interactions that include group discussionand public speaking. Students are also required to expressideas with relevant examples in public speaking and online assessments. They are also exposed to the rudiments of grammar implicitly via the communicative activities.

References

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

PRE-REQUISITE

BLHW 2152 ACADEMIC WRITING/
PENULISAN AKADEMIK

LANGUAGE ELECTIVES COURSES

BLLW XXX2
THIRD LANGUAGE/ BAHASA KETIGA

Course 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 pronunciationand 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 SPAB*

ARABIC LANGUAGE (BLLW 1212)

Course Learning Outcome

① Use the basic Arabic grammar correctly and apply the information from the text.
② Construct sentences and apply selected vocabulary in a report.
③ Demonstrate communication skills.

Synopsis

Basic Arabic is a subject which adopts the communicative approach and introduces the phonology, grammar, vocabulary and writing system. Students will be exposed to basic reading materials in the language and discuss topics in groups besides the exercises and practical conversations. Interaction among students is based on information from oral texts and face-to-face or group activities.

References

- Hasan, A. T., 2009, Mausuah An-Nahwu Wassorp Wali'raf. Shah Alam: UPENA,UiTM.
- Abdul Masih, G. M., 2009, Mu'jam Kawaid Al- Lugatul Arobiah Fi Jadawal Walauhat, Lubnan: Maktabah Lubnan.
- Rahim, A., 2010, Pembelajaran bahasa Arab bagi golongan yang bukan Arab.

MANDARIN LANGUAGE (BLLW 1222)

Course Learning Outcome

① Demonstrate the ability to converse in Mandarin with correct and accurate pronunciation and intonation.
② Use the rules of Chinese writing and the theory of word and sentence formation.
③ Interpret the information in simple text.

Synopsis

This course is designed for students who do not have prior knowledge in Mandarin. It provides students with the foundation of knowledge to enable them to understand and respond in the oral and written forms. This subject encompasses the listening, speaking, reading and writing components. This subject aims to help students to obtain enough exposure of Mandarin phonetics (Han Yu Pin Yin). The basic grammar introduced is related to the language used daily by the Chinese. Particular care is also taken to ensure the development of verbal communication and written skills in mandarin.

References

- Hoon, A. L., Lee, O. B., 2012, Basic Chinese for Everyone. Selangor: Pelanduk Publications.
- Wu, J., and Lu, B., 2011, Chinese Grammar Step by Step. Singapore: Cengage Learning Asia Pte Ltd.
- Nee, S. W., Heng, C. T., San, L. L., Sim, M. S., 2009, Conversational Mandarin Chinese for non- native speakers. Selangor: Xueer publisher.

JAPANESE LANGUAGE (BLLW 1232)

Course Learning Outcome

① Demonstrate the ability to converse in basic Japanese with correct and accurate pronunciation.
② Construct sentences with correct grammar and sentence structure.
③ Identify basic vocabulary and the information in the simple text.

Synopsis

This course is designed for students who do not have any background in Japanese. It provides students with the knowledge to enable them to understand and communicate in the oral and written forms. This course encompasses the listening, speaking, reading and writing components. The grammar introduced is related to the language used daily by the Japanese. In addition, two types of Japanese language writing systems; Hiragana and Katakana are also introduced. Students are also exposed to elementary reading materials.

References

- Mari belajar Bahasa jepun (2017) Penerbit UTeM
- Minna no Nihongo shokyu 1 (2012). (Beginners 1) Translation & Grammatical Notes. 3A Network
- The Association for Japanese-Language Teaching (2009). Shin Nihongo No Kiso 1- English Translation. Asian Edition.
- The Association for Overseas Technical Scholarship (AOTS) (2009). Shin Nihongo No Kiso 1-English Translation. Asian Edition.

^BAHASA MELAYU KOMUNIKASI/ COMMUNICATIVE MALAY LANGUAGE (BLLW 1172)

Course Learning Outcome

① Provide responses to regular conversations and other situations.
② Relate the sounds or speeches in Bahasa Melayu in terms of grammar, phonology and oral skills about yourself, family, friends and daily activities.
③ Discuss easily about a current topic.
④ Build sentences and speak Bahasa Melayu with grammar.

Synopsis

This course introduces the grammar of Bahasa Melayu. Students are exposed to aspects of clauses, terminology, sentence building, mastering numbers and literary elements. It is hoped that students can speak or communicate well and easily based on the ability of foreign students.

References

- Buttner, A., 2013, Aktivitas, permainan dan strategi penilaian untuk kelas bahasa asing. PT Indeks, Jakarta, Indonesia.
- Chye, Y. C., Mashudi, R. and Abd Rahman, M., 2012, Bahasa Kebangsaan untuk pelajar luar negara (Malay Language for International Students). Kuala Lumpur: Pearson Malaysia Sdn Bhd.
- Othman, Z., Hashim, R. and Abdullah, R., 2012, *Modul Komunikasi Melayu Antarabangsa.* Bangi, Selangor: Penerbit Universiti Kebangsaan Malaysia.

^Only for International students.

KOREAN LANGUAGE 1 (BLLW 1242)

Course Learning Outcomes
① Demonstrate the ability to converse in Korean with correct and accurate pronunciation and respond to it accordingly.
② Identify basic vocabulary and demonstrate writing skills.
③ Interpret the information in the simple text and construct sentences with correct grammar.

Synopsis
This course is designed for students who do not have prior knowledge in Korean. It provides students with the foundation of knowledge to enable them to understand and respond in the oral and written forms. This course encompasses the listening, speaking, reading and writing components. This course aims to help students to obtain basic knowledge about Korean language. The basic grammar introduced is related to the language used daily by the Korean. Particular care is also taken to ensure the development of verbal communication and written skills in Korean.

Pre-Requisite None.

References

- K. Park (2015). Essential Korean Vocabulary. Tuttle Publishing.
- P. Jun Seok & S. Chaemin. (2015). Korean: Language 1 For Beginners. Institut Terjemahan & Buku Malaysia.
- J. Hong & W. Lee. (2008). Korean For Dummies. Wiley Publishing Inc

GERMAN LANGUAGE 1 (BLLW 1252)

Course Learning Outcomes
① Demonstrate the ability to converse in basic German with correct and accurate pronunciation and respond to it accordingly.
② Identify basic vocabulary and demonstrate writing skills.
③ Interpret the information in the simple text and construct sentences with correct grammar.

Synopsis
This course is designed for students who do not have prior knowledge in German. It provides students with the foundation of knowledge to enable them to understand and respond in the oral and written forms. This course encompasses the listening, speaking, reading and writing components. This course aims to help students to obtain basic exposure of the German phonetics. The basic grammar introduced is related to the language used daily by the German. Particular care is also taken to ensure the development of verbal communication and written skills in German.

Pre-Requisite None**.**

References

- Rusch, P. (2016). Netzwerk: Intensivtrainer A1 (German Edition). Stuttgart: Klett (Ernst) Verlag,
- Wexenberger, D. (2018). Practise German: Practise- book for German learners A2: Practice German While Reading. German: Independently published

CO-CURICULUM

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

Course Learning Outcomes
Upon completion of this course, students 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.

Remark: Subject to change by SPAB

No.	Course code	Code	Credit	Contact Hours
CULTURE				
1	BKKC 1611	Cak Lempong	1	2
2	BKKC 1601	Gamelan	1	2
3	BKKC 1061	Choir	1	2
4	BKKC 1631	Nasyid	1	2
5	BKKC 1811	English Theater	1	2
6	BKKC 1761	Kompang	1	2
7	BKKC 1141	Silat Gayong	1	2
8	BKKC 1691	Art	1	2
9	BKKC 1791	Chess	1	2
10	BKKC 1641	Khat	1	2
ENTREPRENEURSHIP				
11	BKKE 1791	Journalism	1	2
12	BKKE 1551	Entrepreneursh ip	1	2
13	BKKE 1451	Sport Business	1	2
14	BKKE 1561	Fiqh Muamalat	1	2
15	BKKE 1461	Agropreneur	1	2
INITIATIVE AND INNOVATION				
16	BKKI 1781	Photography	1	2
17	BKKI 1541	I-Creative	1	2
18	BKKI 1531	Invention	1	2

LEADERSHIP				
19	BKKL 1391	Self Management	1	2
20	BKKL 1401	Leadership	1	2
21	BKKL 1411	Health Management	1	2
22	BKKL 1501	The Application of Astronomy in Islam	1	2
23	BKKL 1491	Islamic Treatment Management	1	2
PUBLIC SPEAKING				
24	BKKP 1731	Public Speaking (English)	1	2
25	BKKP 1741	Public Speaking (Malay)	1	2
26	BKKP 1551	Debate (English)	1	2
COMMUNITY SERVICE				
27	BKKM 1831	Peer Group Mentoring	1	2
28	BKKM 1821	Tahsin Al-Quran and Yasin Recitation	1	2
29	BKKM 1811	Fiqh Amali	1	2
30	BKKM 1501	Rakan Cop	1	2
31	BKKM 1561	Courtesy Caring	1	2
32	BKKM 1911	Sustainabilit y of Green Practices	1	2
33	BKKM 1931	Environment al and Green Technology	1	2

**Subject to change by SPAB*
*** Not allowed for BMIK, BMIM students*

No.	Course code	Code	Credit	Contact Hours
COMMUNITY SERVICE				
34	BKKM / DKKM 1921	Electrical Energy Management	1	2
VOLUNTEERING				
35	**BKKV 1421	Kor SUKSIS Police 1	1	2
36	**BKKV 1431	Kor SUKSIS Police 2	1	2
37	**BKKV 1441	Kor SUKSIS Police 3	1	2
38	**BKKV 1451	Kor SUKSIS Police 4	1	2
39	**BKKV 1461	Kor SUKSIS Police 5	1	2
40	**BKKV 1471	Kor SUKSIS Police 6	1	2
41	**BKKV 1481	Kor SISPA 1	1	2
42	**BKKV 1491	Kor SISPA 2	1	2
43	**BKKV 1561	Kor SISPA 3	1	2
44	**BKKV 1591	Kor SISPA 4	1	2
45	**BKKV 1581	Kor SISPA 5	1	2
46	**BKKV 1611	PALAPES 1	1	2
47	**BKKV 1621	PALAPES 2	1	2
48	**BKKV 1631	PALAPES 3	1	2
49	**BKKV 1641	PALAPES 4	1	2
50	**BKKV 1651	PALAPES 5	1	2
51	**BKKV 1661	PALAPES 6	1	2
52	BKKV 1511	Kelana Siswa 1	1	2
53	BKKV 1521	Kelana Siswa 2	1	2
54	BKKV 1471	Red Crescent	1	2
55	BKKV 1851	First Aid	1	2
56	BKKV 1671	Siswa Bomba 1	1	2
57	BKKV 1681	Siswa Bomba 2	1	2
SPORTS				
58	BKKS / DKKS 1031	Volleyball	1	2
59	BKKS / DKKS 1091	Aerobics	1	2
25	BKKP 1741	Public Speaking (Malay)	1	2
26	BKKP 1551	Debate (English)	1	2
27	BKKM 1831	Peer Group Mentoring	1	2
28	BKKM 1821	Tahsin Al-Quran and Yasin Recitation	1	2
60	BKKS 1111	Taekwondo	1	2
61	BKKS 1141	Expedition	1	2
62	BKKS 1101	Badminton	1	2

**Subject to change by SPAB*
*** Not allowed for BMIK, BMIM students*

No.	Course code	Code	Credit	Contact Hours
SPORTS				
63	BKKS 1281	Hockey	1	2
64	BKKS 1321	Futsal	1	2
65	BKKS 1361	Rugby	1	2
66	BKKS 1271	Tennis	1	2
67	BKKS 1331	Athletics	1	2
68	BKKS 1351	Handball	1	2
69	BKKS 1381	Lawn bowl	1	2
70	BKKS 1011	Football	1	2
71	BKKS 1311	Softball	1	2
72	BKKS 1151	Cycling	1	2
73	BKKS 1071	Sepak Takraw	1	2
74	BKKS 1121	Karate-Do	1	2
75	BKKS 1021	Netball	1	2
76	BKKS 1051	Kayaking	1	2
77	BKKS 1501	Petanque	1	2

**Subject to change by SPAB*
*** Not allowed for BMIK, BMIM students*

PHILOSOPHY AND CURRENT CHALLENGES/ FALSAFAH DAN CABARAN SEMASA (BLHW 1772)

Hasil Pembelajaran Kursus

① Menganalisis konsep asas, cabang, dan tokoh utama dalam falsafah serta kaitannya dengan cabaran semasa.
② Memberi justifikasi terhadap isu-isu semasa dari perspektif falsafah dengan menekankan aspek kepimpinan.
③ Menghubungkaitkan kepelbagaian pandangan falsafah dengan nilai etika dalam menangani cabaran semasa.

Sinopsis

Kursus ini menjelaskan asas dan kerangka pemikiran falsafah yang mendasari pembinaan masyarakat Malaysia, dengan menekankan gagasan utama seperti Rukun Negara, Falsafah Pendidikan Kebangsaan, Falsafah Sejahtera, dan Falsafah MADANI. Penggunaan analisis falsafah sebagai alat berfikir diperkenalkan sebagai pendekatan intelektual yang sistematik untuk memahami dan menangani pelbagai cabaran kehidupan semasa. Melalui pendedahan kepada komponen-komponen utama ilmu falsafah, pelajar akan dibimbing untuk menganalisis isu-isu kontemporari serta mengembangkan keupayaan berfikir secara kritis dan reflektif. Di akhir kursus, pelajar diharapkan mampu menilai serta merumuskan strategi berasaskan pendekatan falsafah untuk mendepani cabaran masa depan dan seterusnya menyumbang kepada pembentukan masyarakat Malaysia yang inklusif, sejahtera dan berpandangan jauh.

Rujukan

- Al-Attas, S.M.N. (2020). Islam Dan Sekularisme. RZS-CASIS
- Al-Attas, S.M.N. (2022). Tinjauan Ringkas Peri Ilmu dan Pandangan Alam. Ta'dib International
- Amran Muhammad. (Peny.). (2022). Modul Falsafah dan Isu Semasa [Modul Infografik]. Islamic and Strategic Studies Institute & IIUM.
- Floridi, Luciano. (2021). The Logic of Information: A Theory of Philosophy as Conceptual Design. Oxford University Press.
- Hospers, J. (1997). An Introduction to Philosophical Analysis (4th Ed.). Routledge.
- Julian Baggini (2019). How the World Thinks: A Global History of Philosophy. Granta.
- Merican, A.M; Wan Mamat, W.A.; Bakar, Osman (2021). Colonialism in the Malay Archipelago: Civilisational Encounters. ISTAC-IIUM.
- Mitchell, H.B. (2011). Roots of Wisdom: A Tapestry of Philosophical Traditions (6th Ed.). Cengage Learning.
- Nagel, Thomas. (1987). What Does It All Mean? A Very Short Introduction to Philosophy. Oxford University Press.
- Osman Bakar (1999). The Classification of Knowledge in Islam. Islamic Texts Society.
- Sardar, Ziauddin. (2010). Welcome to Postnormal Times. Futures, 42(5), 435–444.
- Wan Daud, W.M.N (2019). Budaya Ilmu: Makna dan Manifestasi dalam Sejarah dan Masa Kini. RZS-CASIS
- Zaid Ahmad. (2010). The Epistemology of Ibn Khaldun. Routledge.
- Zaid Ahmad. (2018). In Quest of Indigenous Epistemology: Some Notes on a Fourteenth-Century Muslim Scholar, Ibn Khaldun (1332-1406). in Constructing the Pluriverse. Ed. Bernd Reiter. Duke University Press.

*BTMW 1112
BASIC TECHNOPRENEUR/ ASAS TEKNOKEUSAHAWANAN

Course Learning Outcome

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

① Demonstrate essential knowledge on entrepreneurial process in starting their own businesses

② Assess the feasibility and commercial potential on finding the right business opportunities through Michael Potter's five forces of industry structure, SWOT, 4Ps of marketing and marketing mix, value creation, branding, market segmentation, positioning, value creation and social media marketing and entrepreneurial finance tools and materials

③ Perform their own entrepreneurial passion, desire and capabilities which are crucial for successful venture

Synopsis

The course introduces students to the concepts of entrepreneurship. The goal of the course is to provide students with essential information on the entrepreneurial process. The focuses of the course are on business concept development and feasibility analysis to assess the viability of the concept. The course includes concepts of entrepreneurship, creativity, innovation, and new venture creation process. Students will learn to generate ideas, identify opportunities and investigate whether it can be turned into a viable business through feasibility analysis. Entrepreneurial marketing will be given emphasis in this module as it is one of the important factors in feasibility analysis. Concepts such as product positioning, market segmentation, Michael Potter's five forces of industry structure and SWOT (Strength, weakness, Opportunityand Threat) will be introduced. Students will also learn to select, develop, and evaluate new products/ services, set prices to maximize profitability and make the most efficient use of public relations, publicity during product launches and initial rollouts.

References

1. NTU (2013). Entrepreneurship & Innovation Asia. Overview. Nanyang Technological University, Singapore: Nanyang Technopreneurship Center.
2. Kuratko, D. F. (2017). Entrepreneurship: Theory, Process, Practice, 10th edn. Boston, MA, USA: Cengage Learning.
3. Shane, S. A. (2007). Finding Fertile Ground: Identifying Extraordinary Opportunities for New Ventures, 2nd Print. Upper Saddle River, NJ: Pearson Education.
4. Lewis, M. (2012). The New Thing: A Silicon Valley Story. London, Great Britain: Hodder & Stoughton Ltd.
5. Porter, M. E. (2008). Competitive Strategy: Techniques for Analyzing Industries and Competitors. The Free Press.
6. Stross, R. E. (2001). eBoys: The First Inside Account of Venture Capitalists at Work. Crown Publishing Group.

**BMIK/BMIM Students only*

^PHILOSOPHY AND CURRENT ISSUES/ FALSAFAH DAN ISU SEMASA (BLHW 1762)

Course Learning Outcome

① Explain contemporary issues based on philosophical knowledge, the National Education Philosophy (Falsafah Pendidikan Kebangsaan), and the Rukun Negara.
② Discuss contemporary issues based on the major streams and schools of philosophical thought.
③ Analyse contemporary issues through normative and comparative philosophical perspectives as a basis for fostering intercultural dialogue.

Synopsis

This course examines the relationship between philosophy, the National Education Philosophy, and the Rukun Negara in understanding contemporary issues. Philosophy is explored as a tool for refining culture, values, and patterns of thinking in everyday life through both intellectual inquiry and systematic reasoning. Major philosophical themes such as epistemology, metaphysics, and ethics are discussed within the context of current societal issues. Particular emphasis is given to the role of philosophy as a foundation for promoting intercultural understanding, mutual respect, and universal values. By the end of the course, students will be able to appreciate how various fields of knowledge are interconnected and form a comprehensive body of knowledge that contributes to holistic human development and responsible citizenship.

References

- Dzulkifli A. R. dan Rosnani H. (Eds). (2019). Pentafsiran Baharu Falsafah Pendidikan Kebangsaan dan Pelaksanaannya Pasca 2020. Kuala Lumpur: IIUM
- Osman Bakar (2019). Classification of Knowledge in
- Islam: A Study in Islamic Schools of Epistemology. Kuala Lumpur: IBT
- Shaharir Mohamad Zain (2018), Falsafah Ilmu Daripada
- Karya-Karya Besar Sains dan Matematik Islam Malayonesia, Akademi Kajian Ketamadunan.
- Maszlee Malik (2017). Foundation of Islamic Governance : A Southeast Asian Perspective (1st Ed). London & New York : A Routledge.
- Osman Bakar (2016). Qur'anic Pictures of the Universe:
- The Scriptural Foundation of Islamic Cosmology. Kuala Lumpur: UBD dan IBT.
- Shaharir Mohamad Zain (2012), Berakhir Sudahkah Ilmu Dalam Acuan Sendiri? Kuala Lumpur: Pusat Dialog
- Peradaban UM.
- Tajul Ariffin Noordin (1993). Perspektif Falsafah dan Pendidikan di Malaysia. Kuala Lumpur: Dewan Bahasa dan Pustaka.

APPRECIATION OF ETHICS ANDCIVILIZATIONS/ PENGHAYATAN ETIKA DAN PERADABAN (BLHW 2772)

Course Learning Outcome

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

Explain the theory and concept of ethics from different perspectives of civilization.
① Explain the importance of contemporary issuesrelated to various fields according to the mold ofethics and civilization.
② 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

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

^Only for International students.

MALAYSIAN NATION STATE/ ASPIRASI NEGARA BANGSA (BLHW 2722)

Hasil Pembelajaran Kursus

① Menganalisis konsep negara bangsa Malaysia melalui susur galur sejarah, perubahan sosiobudaya dan keunikan masyarakat.
② Mengamalkan prinsip kenegaraan dan perpaduan dalam konteks kehidupan seharian berasaskan acuan negara bangsa Malaysia.
③ Mengintegrasikan aspirasi Malaysia dalam kehidupan bermasyarakat bagi merealisasikan pembangunan negara bangsa yang lestari, harmoni dan inklusif.

Sinopsis

Kursus ini meneroka asas pembentukan dan pembangunan negara bangsa Malaysia yang menekankan kepada elemen kenegaraan, sejarah interaksi etnik dan keunikan masyarakat Malaysia. Kursus ini turut membincangkan kerangka teori perpaduan, konsep negara bangsa serta visi Bangsa Malaysia Idaman yang berpaksikan nilai Rukun Negara, Wawasan 2020, Malaysia Madani dan inisiatif nasional lain. Selain itu, kursus ini memberi pendedahan kepada pelajar tentang realiti semasa merangkumi sentimen kewilayahan dan keserantauan serta cabaran dalam membina masyarakat yang harmoni dan inklusif. Penekanan turut diberikan kepada pengaruh dan kesan teknologi serta perubahan iklim terhadap aspirasi pembangunan negara bangsa, selari dengan agenda pembangunan lestari (SDG). Pengajaran dan pembelajaran (PdP) kursus akan memperkukuh pemahaman pelajar tentang aspirasi Malaysia sebagai sebuah negara progresif dan toleran, menitikberatkan nilai sepunya seperti muhibah, penerimaan, keharmonian dan perkongsian nilai bersama.

Rujukan

- Abdul Rahman Embong (2020). Negara-Bangsa, Proses dan Perbahasan, Edisi Kedua, Penerbit Universiti Kebangsaan Malaysia
- Baharuddin, S.A. (Ed). (2012). Modul hubungan etnik (2nd ed.). Bangi: Institut Kajian Etnik, UKM.
- Hairol Anuar Mak Din, Shamrahayu Ab. Aziz dan Mohd Mahadee Ismail.(2024).Penghayatan Etika dan Peradaban, Memahami Asas dan Kedinamika Negara Bangsa Malaysia, Penerbit Universiti Islam Selangor
- Mansor Mohd Noor. (2021). Changing Ethnic Boundary, Social Differentiation and the Malaysia Stability, Universiti Kebangsaan Malaysia
- Mohamed Mustafa Ishak.(2014). The Politics Of Bangsa Malaysia: Nation-Building in A Multiethnic Society, UUM Press
- Mohammad Redzuan Othman (2006). Sejarah Pembinaan Negara Bangsa, Universiti Malaya.
- Mohd Mahadee Ismail.(2019). Politik, Etnisiti dan Peradaban: Dinamika Masyarakat , Penerbit Universiti Putra Malaysia
- Mohd Rahimi Ramli, Muhammad Shamsinor Abdul Azzis dan Noor Ain Mat Noor.(2023). Penghayatan Etika dan Peradaban, UM Press
- Nazri Muslim. (2020). Islam dan Melayu dalam Perlembagaan: Tiang Seri Hubungan Etnik di Malaysia. Edisi Kedua. Bangi: Penerbit UKM.
- Zulkifli Salleh. (2024). Negara Bangsa Malaysia, Gerakan Nasionalisme, Perjuangan Politik dan Dasar Negara, Dewan Bahasa dan Pustaka.

^MALAYSIAN CITRA/ CITRA MALAYSIA (BLHW 2752)

Course Learning Outcome
① Explain the unique identity of Malaysia as a multiethnic and multicultural nation
② Analyse Malaysia's political and economic system transformation in fostering sustainable development.
③ Share perspectives on Malaysia's identity and role on the global stage, based on the values of harmony and tolerance in building a progressive society.

Synopsis
This course offers a comprehensive introduction to Malaysia, encompassing its historical evolution, geographical diversity, cultural richness, and socio-political development. Students will explore the formation of modern Malaysia, its multicultural society, linguistic diversity, and unique traditions rooted in its ethnic and religious plurality. The course also highlights Malaysia's traditional arts and heritage, including UNESCO-recognized elements. Students will gain foundational knowledge of Malaysia's political and government systems, federal structure, and constitutional monarchy. In addition, the course examines the transformation of Malaysia's economy, key industrial sectors, and current challenges within the digital and sustainable development contexts. Malaysia's prominence as an international tourism hub and its global achievements in diplomacy, sports, and trade are also emphasized. The final section of the course focuses on Malaysia's future prospects, particularly concerning smart cities, climate change, youth engagement, and innovation. Through this course, students will develop a well-rounded understanding of Malaysia's national identity and its evolving role on the world stage. Teaching and learning process through experiential learning, lecture and assignment enables students to acquire knowledge and appreciate the reality of life in Malaysia.

References

- Abdul Halim Nasir (2004). Mosque Architecture in the Malay World. Bangi: Penerbit Universiti Kebangsaan Malaysia.
- Adnan A. Hezri. (2021). The Sustainability Shift: Refashioning Malaysia's Future, Areca Books
- Andaya, B.W. and Andaya, L. Y. (2001). A History of Malaysia. Hampshire: Palgrave.
- Berbar, Henry & Mamell, Florent. (2024). Journey Through Malaysia. HBL Network Creative Solutions.
- Bowden, David. (2025). Enchanting Malaysia. John Beaufoy Publishing Ltd (GB).
- Chew Fong Peng. (2009). Culture, language and literature in Malaysian society: Plural Culture and Society in Malaysia. Kuala Lumpur: Jabatan Kebudayaan dan Kesenian Negara
- Harding, Andrew. (2022). The Constitution of Malaysia, 2nd Edition. Bloomsbury Publishing
- Hassan, M. Kamal and Ghazali Basri. (2006). Religions and Beliefs (Encyclopedia of Malaysia), Editions Didier Millet (US)
- Kalai Vani Kalimuthu, Vikniswari Vija Kumaran, Foo Chuan Chew, Thurai Murugan Nathan, Muhammad Baqir bin Abdullah, Siti Nurul Munawwarah & Mohd Khairi Ismail. (2025). Malaysian Economy. SJ Learning.
- King, Victor. (2021). Malaysia - Culture Smart!: The Essential Guide to Customs & Culture (Culture Smart!). Kuperard (US).
- Nor Zaini Zainal Abidin, Asri Salleh, Ilyas Abdullah & Nor Farizah Johari. (2024). Government and Politics. UiTM Press.
- Siew-Voon Soon, Mohammad Mafrukhin Mokhtar Chee-Wooi Hooy & Kim-Leng Yeah. (2024). Empowering Communities for Sustainable Financial Well-Being in Malaysia. UM Press.
- Tan, W., Brown, L. & Ferrarese, M. (2024). Lonely Planet Malaysia, Singapore & Brunei: Detailed Itineraries. Lonely Planet Global Limited (GB)

^Only for International students.

CAPSTONE TECHNOPRENEURSHIP 1/ CAPSTONE TEKNOKEUSAHAWANAN 1 (BTMW 2124)

Course Learning Outcome

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

① Apply various financial indicators & tools to prepare for financial information for a new business venture.
② Acquire skills to analyze financial statements.
③ Present financial information for new busines.
④ Display the art of negotiation with investors.

Synopsis

Entrepreneurs need money to start and to grow their business. It is important to understand how revenueis generated, how to source for funds, how to control cash flow, how to assess the success of the company in monetary terms, and how to value a company for various purposes. The course exposes students to the various financial aspects relating to new ventures. These include approaches to secure start-up capital and venture financing. Students learn about the basic accounting, essential financial indicators, the types of funds available, the different categories of investors, the importance of intellectual property in securing finance, the financial details to be included in a business plan required for investment purpose, valuation of company and the art of negotiation with investors.

References

- NTU (2013). Entrepreneurship & Innovation Asia. Overview. Nanyang Technological University, Singapore: Nanyang Technopreneurship Center.
- Cremades, A. (2016). The Art of Startup Fundraising. Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Hoboken, NJ: John Wiley & Sons.
- McKinsey & Co., Koller, T., Goedhart, M. & Wessels, D. (2015). Valuation. Measuring and Managing the Value of Companies, 6th ed. Hoboken, NJ: JohnWiley & Sons.

CAPSTONE TECHNOPRENEURSHIP 2/ CAPSTONE TEKNOKEUSAHAWANAN 2 (BTMW 3134)

Course Learning Outcome

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

① Apply the business model canvas incorporating human and financial elements.
② Acquire skills to resolve organizational conflicts Present financial information for new business.
③ Write a convincing business plan.
④ Evaluate vital organizational behaviours necessary to grow a new venture.
⑤ Motivate all stakeholders and build a cohesive venture team.

Synopsis

The start-up and growth of an enterprise invariably involves both human and financial capital. To managethe increasing pool of human resources and to convince venture capitalists to invest become two main issues especially for growing venture. This course consists of two parts: in the first part, organization and human resource management are introduced; in the second part, the focus is on writing a convincing business plan to attract venture capital investment. When enterprise starts to take shape and grow, more people will be hired, proper organization, team building and human resource management will become important issues. In this course, students will be exposed to the various organizational aspects relevant to new ventures and established companies. These include the pros and cons of the different organization structures, conflicts that may arise among employees, and approaches to building strong teams. Human resourse management techniques will also be introduced and discussed. In the second part of the course, the business model canvas will be described listing the connections among the different components of a business. The value of a business plan and the techniques of writing a business plan will be introduced.

References

- NTU (2013). Entrepreneurship & Innovation Asia. Overview. Nanyang Technological University,Singapore: Nanyang Technopreneurship Center.
- Cremades, A. (2016). The Art of Startup Fundraising. Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Hoboken, NJ: John Wiley & Sons.

INTEGRITY AND ANTI-CORRUPTION (BLHW 2792)

Course Learning Outcome

① Elaborate integrity value in daily life.
② Evaluate forms of corruption and misuse of power in life and organization.
③ Demonstrate the value of integrity and prevention of corruption through community activities.

Synopsis

This Integrity and Anti-Corruption Course (KIAR) aims to introduce students to integrity practices and corruption prevention management in society and organizations.
Emphasis will be given to theory and practice related to the value of integrity and prevention of corruption, issues, problems and challenges of corruption crime management in society and organizations. Learning activities include training in groups, simulations, writing official documents and field work in the community of various sectors (public sector, private sector, NGOs, politics and students).

References

- Mohamad Tarmize (2014). Nota Pencegahan Rasuah. Penerbit Bahagian Pendidikan Masyarakat, Suruhanjaya Pencegahan Rasuah Malaysia. Pengurusan, Pembangunan Islam Universiti Sains Malaysia.
- Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 (2009).
- Akta Pencegahan Pengubahan Wang Haram, Pencegahan Pembiayaan Keganasan dan Hasil daripada Aktiviti Haram 2001.
- Akta Perlindungan Pemberi Maklumat 2010. Akta Perlindungan Saksi 2009.
- Institut Integriti Malaysia (2005). Pelan Integriti Nasional.
- Rahimah Abdul Rahim (2016). Siri Penyelidikan Pengajian Rasuah: Rasuah, Governans & Integriti. Penerbitan Akademi Pencegahan Rasuah Malaysia.
- Syed Hussein Alatas (2009). Rasuah: Sifat, sebab dan fungsi. Dewan Bahasa dan Pustaka: Kuala Lumpur.
- Zulkarnian Abdul Rahman, Ahmad Kamal Ariffin Mohd Rus & Noor Ain Mat Noor (2017). Sejarah Perjuangan SPRM Satu Perjalanan. Universiti Malaya, Kuala Lumpur.
- Syed Hussein Al-Attas. (1983). Sosiologi Korupsi. Singapura: Delta Press.
- Syed Ibrahim. (2007). Malaysia Kita. Kuala Lumpur: Institut Tadbiran Awam Negara (INTAN).

CRITICAL AND CREATIVE THINKING/ PEMIKIRAN KRITIS DAN KREATIF (BLHC 4032)

Course 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

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

TECHNOLOGY ENTREPRENEURSHIP (BTMW 4012)

Course Learning Outcome
① Apply the concept and importance of entrepreneurship to real-world situation
② Demonstrate the techniques in digital entrepreneurship practiced by entrepreneurs to market a business
③ Choose suitable business ideas and processes in developing a business plan for a small business.

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 subject allows students to critically evaluate business in terms of technical feasibility, investment potential, and risks.

References

- Thomas N. Duening, Robert A. Hisrich, Michael A. Lechter (2020).Technology Entrepreneurship: Taking Innovation to the Marketplace, Elsevier Science.
- Arifin, S. & Hamidon, S. (2017). Introduction to Entrepreneurship. Oxford Fajar
- Barringer, B. R. and Ireland, R. D. (2015). Entrepreneurship: Successfully Launching New Ventures. 5 th International Edition, Pearson.
- Barker, Melissa S (2013). Social media marketing : a strategic approach. South Western, OH : Cengage. Call Number HF5415.1265 .S62 2013
- Scarborough, N. (2014). Essentials of entrepreneurship and small business management. Boston: Pearson.
- UiTM Entrepreneurship Study Group. Revised Edition, 2010, Fundamentals of Entrepreneurship. Pearson.

CRITICAL AND CREATIVE THINKING/ PEMIKIRAN KRITIS DAN KREATIF (BLHC 4032)

Course Learning Outcome
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

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

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

Course Learning Outcome
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 knowledgein philosophy, science and technology that targetsthe 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 aswell 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

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

ORGANIZATIONAL COMMUNICATION/ KOMUNIKASI KEORGANISASIAN (BLHC 4012)

Course Learning Outcome
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 introduces students to the fundamental concepts of organizations and organizational communication. Students will explore key theories and models of organizational communication and examine the roles of leadership, formal communication, and informal communication in achieving organizational effectiveness. The course also addresses communication barriers, problem-solving techniques, and decision-making processes within organizational settings. Furthermore, students will develop an understanding of organizational culture and climate, the impact of technology on communication practices, and the dynamics of organizational relationships. By the end of the course, students will be able to appreciate the importance of effective communication in fostering collaboration, enhancing organizational performance, and supporting corporate communication functions.

References

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

INDUSTRIAL AND ORGANIZATIONAL PSYCHOLOGY/ PSIKOLOGI INDUSTRI DAN ORGANISASI (BLHH 1032)

Course Learning Outcome

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 aprospective employee in the organization.

Synopsis

This course provides exposure to the psychological aspects of the world of work in the industrial sector as wellas 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

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

NEGOTIATION SKILLS/ KEMAHIRAN PERUNDINGAN (BLHC 4022)

Course Learning Outcome

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 onvarious 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 theknowledge 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 consultationprocess will also be discussed.

References

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

STAFF

DIRECTORY

Academicians

Engineering Programme

Manufacturing Engineering (BMIG)

Manufacturing Engineering – Part Time (BMIG)

Industrial Engineering (BMIF)

Engineering Technology Programme

Engineering Technology (Product Design) (BMID)

Engineering Technology (Process and Technology) (BMIP)

Manufacturing Engineering Technology (BMIW)

Technology Programme

Technology in Welding (BMIK)

Technology in Industrial Machining (BMIM)

Dedicated Lecturers

Program: Manufacturing Engineering (BMIG)

Head of Programme

Dr. Masni-Azian binti Akiah
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B.Eng. Engineering/CADCAM (UM) M.Eng. Manufacturing (UM)
Ph.D. Mechanical Science and Bioengineering (Osaka University, Japan)

Research interests:
Bioengineering; Computational Modeling and Simulation

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B.Eng. Manufacturing Engineering with Management (USM)
M.Eng. Manufacturing Engineering (UNSW, Australia)
Ph.D. Mechanical Engineering (University of Birmingham, UK)

Research interests:
Continuous Optimization; Industrial Automation

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B.Eng. Materials Engineering (USM) M.Sc. Materials Engineering (USM)
Ph.D. Engineering Materials (University of Sheffield, UK)

Research interests:
High temperature Materials, Nanocomposite Coating, Materials Characterization, Waste Immobilization

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Dip. Mechanical Engineering – Manufacturing (UiTM)
B.Eng. Mechanical Engineering (UiTM) M.Sc. Engineering Design (Loughborough University, UK)
Ph.D. Engineering Design (UPM)

Research interests:
Concurrent Engineering; New Product Development; Green Design; 3D Modeling; Finite Element

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B.Sc. Applied Mathematics Modeling (USM)
M.Sc. Mathematics (USM)
Ph.D. Computer Aided Geometric Design (USM)

Research interests:
Computer Aided Geometric Design; CAD/CAE; Bio-Inspired Design; Ecological and Environmental Modelling; Mathematical and Computer Modelling

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B.Eng. Manufacturing Engineering with Management (USM)
M.Sc. Advance Manufacturing Technology & System Management (Manchester University, UK)
Ph.D. in Mechanical Engineering (University of Canterbury, New Zealand)

Research interests:
Dimensional Metrology, 3D Laser Scanner, Manufacturing Technology & System

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B.Eng. Materials (UM)
M.Sc. Materials Engineering (UM) Ph.D. Materials Science & Engineering (University of Sheffield, UK)

Research interests:
Biomaterials Coating

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B.Eng. Manufacturing System (Fluid Flow) (University Of Tokushima, Japan)
M.Sc. Mechatronics (Loughborough Univ., UK)
Ph.D. Mechanical Engineering (Mobile Robotic) (UTM)

Research interests:
Robotic; Mobile Robot; Mobile Manipulator; Active Force Control

Associate Professor Dr. Mohd. Amri bin Sulaiman
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B.Eng. CAD/CAM & Manufacturing (UM) M.Eng. Manufacturing System Engineering (UPM)
Ph.D. Mechanical and Materials Engineering (UKM)

Research interests:
Advanced Manufacturing Technology & Design
Ph.D. Mechanical and Materials Engineering (UKM)
Research interests: Manufacturing Systems Engineering

Ts. Dr. Ruzaidi bin Zamri
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B.Eng. Mechanical Engineering (UTM) M.Eng. Mechanical (Advanced Manufacturing Technology) (UTM) Master of Education (UTM)
Ph.D. Manufacturing System Engineering (UPM)

Research interests:
Image Processing; Optimization; Artificial Intelligence

Dedicated Lecturers

Program: Manufacturing Engineering (BMIG)
Part Time

 **Head of Programme**	**Ts. Dr. Syahriza binti Ismail** syahriza@utem.edu.my B.Eng. Materials Engineering (USM) M.Sc. Materials Engineering (USM) Ph.D. Advanced Materials (USM) **Research interests:** Electroceramics & Materials, Nanomaterials, Funtional Metal Oxide
	**Professor Dr. Zamberi bin Jamaludin** zamberi@utem.edu.my B.Eng. Chemical Engineering (Lakehead University, Canada) M.Eng. Manufacturing System (UKM) Ph.D. in Control Engineering (Katholieke Universiteit Leuven, Belgium) **Research interests:** Control Systems, Mechatronic
	**Associate Professor Ir. Dr. Liew Pay Jun, CEng.** payjun@utem.edu.my B.Eng. Mechanical Engineering (KUiTTHO) M.Sc. Manufacturing System Engineering (Coventry University, UK) Ph.D. Mechanical Systems and Design (Tohoku University, Japan) **Research interests:** Non-traditional Machining Process

	**Associate Professor Ir. Ts. Dr. Shajahan bin Maidin, CEng** shajahan@utem.edu.my B.Eng. Manufacturing System Engineering (Univ. of Portsmouth, UK) M.Sc. Manufacturing System Engineering (Univ. of Warwick, UK) Ph.D. Design for Additive Manufacturing (Loughborough University, UK) **Research interests:** Additive Manufacturing; Sustainable Product Development; Concurrent Engineering; Reverse Engineering; CAD; Product Design
	**Associate Professor Ir. Dr. Lokman bin Abdullah** lokman@utem.edu.my B.Eng. Manufacturing Engineering (UIAM) M.Sc Manufacturing System Engineering (Coventry University, UK) Ph.D. Control Engineering (UTeM) **Research interests:** Control System; Analytical Hierarchy Process (AHP), Energy Clustering, RFID; Automation

	**Ts. Dr. Fairul Azni bin Jafar** fairul@utem.edu.my B.Eng. Mechanical Precision Engineering (Utsunomiya University, Japan) B.A. Business Administration (Honors) Marketing (UiTM) M.Sc. Mechanical Engineering (Utsunomiya University, Japan) Ph.D. Production Information (Utsunomiya University, Japan) **Research interests:** Kansei Robotic (Human- Robot Interface); Technology and Innovation Management; Mobile Robotics and Vision Automated Manufacturing
	**Dr. Muhammad Syafiq bin Syed Mohamed** syafiq@utem.edu.my B.S. Engineering Industry Ergonomics (Univ. of Wisconsin Madison, USA) M.S. Industrial Engineering (Ergonomics) (University of Wisconsin Madison, USA) Ph.D. Occupational Safety and Health (UPM) **Research interests:** Industrial Ergonomics, Occupational Safety & Health
	**Nurul Wirdah binti Mafazi** nurulwirdah@utem.edu.my B.Sc. Mathematics (USM) M.Sc. Mathematics (USM) **Research interests:** Mathematics

Dedicated Lecturers

Program: Industrial Engineering (BMIF)

Head of Programme

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B.Sc. Industrial Engineering
(University of Wisconsin – Madison, USA) M.Sc. Industrial and Systems Engineering
(The Ohio State University, USA)
Ph.D. Industrial and Systems Engineering (The Ohio State University, USA)

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Operations Management, Productivity Improvement, Industrial Ergonomics

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B.Eng. (Honors) Manufacturing Engineering (UM)
MSc. Business Management (Coventry University, UK)
D.Eng. Engineering Intelligence Structures and Mechanics Systems Engineering (University of Tokushima, Japan)

Research interests: Operations Management, Optimization, Production Engineering, Modeling and Simulation

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B.Sc. Civil Engineering (UTM) M.Eng. (Civil-Structure) (UTM)
Ph.D. Facilities Management (Liverpool John Moores University, UK)

Research interests:
Project Management, Facilities Management

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B.Eng. Mechanical Engineering (UiTM) M.Sc. Mechanical Engineering (UiTM) Ph.D. in Mechanical Engineering (UiTM)

Research interests:
Industrial Ergonomics, Occupational Safety & Health

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B.Eng. Mechanical (UKM)
M.Eng. Manufacturing Engineering (Technical Univ. of Berlin, Germany)
Dr. -Ing. Assembly Technology and Factory Management (Technische Universität Berlin, Germany)

Research interests:
Operations Management, System Modelling, Automation and Robotics, Manufacturing Systems Integration

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B.Eng. Mechanical (Manufacturing) (UTM)
M.Eng. Mechanical (Manufacturing Technology) (UTM)
Ph.D. Mechanical Engineering (Biomechanics/ Ergonomic) (Sheffield Hallam University, UK)

Research interests:
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Nor Akramin bin Mohamad
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B.Eng. Mechanical Engineering (Industrial) (UTM)
M.Eng. Mechanical Engineering (Advanced Manufacturing Technology) (UTM)

Research interests:
Quality and Reliability, Operations Management

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B.Eng. Mechanical and Material Engineering (UKM)
M.Sc. Mechanical Engineering (UKM)
Ph.D. Mechanical Engineering (University of Sheffield, UK)

Research interests:
Composite Materials (Polymer, Ceramic), Green Materials, Non-Metal Processing,
Single Fiber Testing

Dr. Nurul Hajar binti Mohd Yussoff
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Diploma in Computer Science (UiTM)
B. Sc. (Hons) Mathematics (UiTM)
M. Sc. Mathematical Sciences (UMT)
Ph.D. in Mathematics (Optimization) (UniSZA)

Research interests:
Applied Mathematics, Optimization, Numerical Analysis, Mathematical Programming, Operational Research

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B.Eng. Mechanical Engineering (UNITEN) M.Sc. Manufacturing System Engineering (Coventry University, UK)
Ph.D. Mechanical & Materials Engineering (UKM)

Research interests:
New Product Development

Dedicated Lecturers

Program: Manufacturing Engineering Technology (Product Design) (BMID)

Head of Programme

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B.Eng. Mechanical (UiTM)
M.Eng. Manufacturing Systems Engineering (UPM)
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Research interests:
CAD/CAM, Product Design & Development, Rapid Manufacturing and Reverse Engineering, Design Optimization, DFMA

Ts. Dr. Khairum bin Hamzah
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Dip. Science (UiTM)
B.Sc. Mathematics (UiTM) M.Sc. Mathematics (USM)
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Research interests:
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B.Sc. Engineering (Korea University, Korea)
M.Eng. Mechanics (UKM)
Ph.D. Mechanical Engineering (UPM)

Research interests:
Concurrent Engineering Design, Natural Fibre Composite, Conceptual Design

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Dipl.Ing. (FH) Mechanical Engineering (Albstadt-Sigmaringen University, Germany)
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Ph.D. Packaging Electronic (Mechanical) (USM)

Research interests:
Electronic Packaging; Applied CFD; Green Energy System; Mechatronic Design

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B.Sc. Mechanical Engineering (University of Wisconsin – Madison, USA)
M.Sc. Integrated Systems Engineering (The Ohio State University, Columbus, USA)
Ph.D. Integrated Systems Engineering (The Ohio State University, Columbus, USA)

Research interests:
Ergonomic Design

Ts. Hassan bin Attan
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Dip. Manufacturing Technology (Politeknik Port Dickson)
B.Eng. Manufacturing Systems Engineering (University of Portsmouth, UK)
MSc. Manufacturing Engineering (UTeM)

Research interests:
Reverse Engineering, Rapid Protottyping/Additive Manufacturing, CADCAM, Sheet Metal Fabrication, CAD and Sustainable Design.

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Research interests:
CAD/CAM, Rapid Manufacturing, Product Design & Development

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Dip. Mechanical engineering (UTM) B.Eng. Mechanical-Manufacturing (UTM) M.Eng. Innovation & Engineering Design (UPM)

Research interests:
CAE, Life Cycle Engineering, Ecodesign

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B.Eng. Mechanical-Manufacturing (UTM)
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Research interests:
Rapid Prototyping & Manufacturing, Product Design & Development

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B.Eng. Materials Engineering (USM)
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Research interests:
Surface Coating Technology, Materials characterization

Dedicated Lecturers

Program: Manufacturing Engineering Technology (Process and Technology) (BMIP)

 **Head of Programme**	**Ts. Dr. Nazri Huzaimi bin Zakaria** nazrihuzaimi@utem.edu.my B.Eng. Structure and Material (UTeM) M.Eng. Mechanical Engineering (UTM) Ph.D. in Mechanical Engineering (UTHM) **Research interests:** Material Engineering, Materials Science, Advanced Material Polymer, Natural Composite and Structure Analysis
	**Dr. Iskandar bin Waini** iskandarwaini@utem.edu.my B.Sc. (Mathematics), UTM M.Sc. (Mathematics), UTM Ph.D. (Mathematics), UKM **Research interests:** Applied Mathematics, Boundary Layer Problem, Flow & Heat Transfer
	**Associate Professor Ir. Ts. Dr. Mohd Yuhazri Bin Yaakob** yuhazri@utem.edu.my B.Eng. Mechanical Engineering (KUiTTHO) M.Sc. Manufacturing Engineering (UTeM) Ph.D. Mechanical Engineering (NDUM) **Research interests:** Mechanical Engineering, Design,,Composite Technology, Green Materials and Processing, Ballistic and Impact Engineering

	**Ts. Dr. Syahrul Azwan bin Sundi** syahrul.azwan@utem.edu.my B.Eng. Mechanical Engineering (USM) M.Sc. Manufacturing Engineering (UTeM) Ph.D. Manufacturing Engineering (UTeM) **Research interests:** CAD/CAM, Cutting Tools Technology, CNC Technology, Aerospace Machining (Metallic & Composite Material) & Precision Machining
	**Ts. Dr. Hanizam bin Hashim** hanizam@utem.edu.my B.Eng. Manufacturing System with Mechanical Engineering (Bradford University, UK) M.Sc. Manufacturing Engineering (UTeM) Ph.D. Mechanical & Materials Engineering (UKM) **Research interests:** PVD Thin film coating, Surface Mount Technology, Product Assembly, Carbon Nanotiub, Metal Matrix Composite

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Research interests:
Product Design; Green Manufacturing

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Ph.D. Manufacturing Engineering (UKM)

Research interests:
Semi-Solid Process, Metal Matrix Composites, Tribology

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B.Eng. Manufacturing Engineering (Robotics & Automation) (UTeM)
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Research interests:
Automation; Green Technology; Mobile Robot

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B.Eng. Mechanical Engineering (USM)

Research interests:
Advanced Composite Manufacturing, Industrial Engineering, Lean Manufacturing

Dedicated Lecturers

Program: Manufacturing Engineering Technology (BMIW)

Head of Programme

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Dip. Eng.Tech. Machine Building and Maintenance (UniKL MFI)
B.Eng.Tech. Machine Tools Manufacturing (UniKL MFI)
M.Eng. Advance Manufacturing Technology (UTM)
PhD Mechanical Engineering (UTM)

Research interests:
Metal Casting, Mould & Die

Ts. Dr. Mohd Soufhwee bin Abd Rahman
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B.Eng. Mechanical-Industry (UTM)
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Ph.D. Mechanical Engineering (Industry) (UTeM)

Research interests:
Quality Control & Management, Industrial Engineering

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Research interests:
Applied Statistics, Experimental Design, Biostatics

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Research interests:
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Ph.D. Mechanical Engineering (University of Melbourne, Australia)

Research interests:
Additive manufacturing, 3D Printing, Design for Manufacture Assembly, Spatial Visualisation, Reading Interpreting Engineering

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B.Sc. Industrial Engineering (State University of New York, USA)
M.Sc. Manufacturing Engineering (UTeM)
Ph.D Manufacturing Engineering (UTeM)

Research interests:
Productivity Improvement, Operational Excellence, Modeling and Simulation, Lean Six Sigma

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B.Eng. Materials Engineering (USM)
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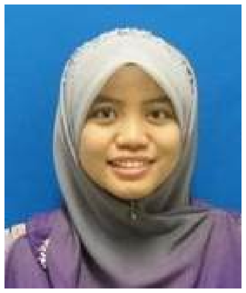
Ph.D. Mechanical Engineering (UPM)

Research interests:
Polymer (Rubber & Latex), Composite Material, Material Testing & Characterization



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B. Eng(Hons) Mechanical Engineering (UTP)
M.Eng Manufacturing Engineering (Industrial Engineering), UTeM

Research interests:
Industrial Engineering, Manufacturing Management

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B.Eng.Tech. Tool and Die (UniKL IPROM)
M.Eng. Innovation & Engineering Design (UPM)
Ph.D Mechanical Engineering (UiTM)

Research interests:
Design and Development, CAD/CAM

Ts. Muhammad Syafik bin Jumali
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M.Sc. Manufacturing Engineering (UTeM)
B.Eng. Mechanical and Manufacturing Systems (UNIMAS)

Research interests: CNC Machining, Cutting Tool

Dedicated Lecturers

Program: Technology in Welding (BMIK)

Head of Programme

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Dip. Mechanical-Manufactruring (Politeknik Port Dickson)
B.Eng. Manufacturing Engineering (Engineering Materials) (UTeM)
M.Eng. Mechanical-Materials (UTM)
Ph.D. Mechanical Engineering (UTM)

Research interests:
Welding, Corrosion, Coating and Engineering Material.

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B.Eng. Materials Engineering (UM)
M.Eng. Mechanical Engineering (UiTM)
Ph.D. Engineering (UIA)

Research interests:
Advanced Material, Automotive Materials, Tribology, Materials Engineering, Surface modification, Welding technology, Taguchi

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B.Mechanical Engineering-Design Innovation (UTeM)
M.Sc. Mechanical Engineering (UTeM)
Ph.D. Mechanical Engineering (UTeM)

Research interests:
Welding , Additive Manufacturing, 3D printing, Wire arc additive manufacturing.

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B.Eng. Material Engineering (USM) M.Eng. Mechanical (Materials) (UTM)

Research interests:
Corrosion, Metallic material

Dr. Muhammad Zaimi bin Zainal Abidin
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B.Eng. Material Science Engineering (Yamaguchi University, Japan)
M. Eng. Materials Science & Engineering (Shibaura Institute of Technology, Japan) Ph.D. Regional Environment Systems (Shibaura Institute of Technology, Japan)

Research interests:
Material Science Engineering; Electrochemistry; Corrosion; Degradation Coating

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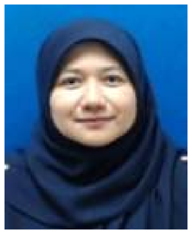
B.Eng. Mineral Resources Engineering (USM)
M.Sc. Materials Engineering (USM)
Ph.D. Materials Engineering (University Of Southampton, UK)

Research interests:
Metal-Ceramic Composite Coating, Surface Pre Treatment on Metals, Tribological Testing



Prof. Dr. Nur Izan Syahriah binti Hussein
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B.Eng. Mechanical (UIA)
M.Sc. Manufacturing System Engineering (Univ. of Warrick, UK)
PhD. Manufacturing Eng. (Univ. of Nottingham, UK)

Research interests:
Vibration Analysis Technology

Ruzy Haryati binti Hambali
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B.Sc Manufacturing Engineering (UIA) M.Sc. Advance Manufacturing Technology (University of Portsmouth, UK)

Research interests:
Rapid Product Development

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B.Eng. Mechanical (UTM)
M.Sc. Manufacturing System Engineering (UPM)
PhD. Manufacturing Eng. (UTeM)

Research interests:
Vibration Analysis Technology

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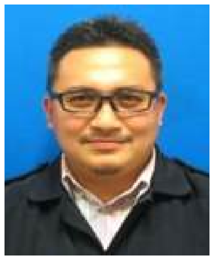
B.Eng. Material Engineering (USM)
M.Sc. Material Engineering (USM)
Ph.D. Electroceramics (USM)

Research interests:
Electroceramics, Corrosion, Advanced Materials



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B.Sc. Tech. Mgmt. Manufacturing Management (UTM)
M.Sc. Quality & Productivity Improvement (UKM)
Ph.D. Mechanical & Material Engineering (UKM)

Research interests:
Lean Manufacturing, Modeling & Simulation, Optimisation

Associate Professor Ts. Dr. Lau Kok Tee
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B.Sc. Applied Physics (UKM) M.Sc. Physics (UKM)
Ph.D. Materials Science & Engineering (UNSW, Australia)

Research interests:
Electrodeposition and surface modification, Functional Coating Materials, Colloid and Surface Chemistry

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B.Eng. Mechanical Engineering-Design & Innovation (UTeM)

Research interests:
Product Design & Development

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B.Eng. Mechanical Engineering (UTM) M.Eng. Mechanical (UTM)
Ph.D. Mechanical Engineering (Tohoku University, Japan)

Research interests:
Product Design; Engineering Design; Syntheses and Analysis; Vibration and Noise

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Industrial Dip. Production Technology (Mould Technolgy) (GMI)
B.Eng.Tech. Product Design (UniKL IPROM)
MSc.(Eng.) Product Design & Management (University of Liverpool, UK)

Research interests:
Life Cycle Assessment, DFMA, Product Design

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B.Eng. Mechanical Engineering (MNNIT)
M.Eng. Production Engineering (BIT MESRA)
Ph.D: Mechanical Engineering (Advanced Manufacturing processes &Hybrid Manufacturing processes (KUVEMPU Univ.)

Research interst:
Advanced Manufacturing processes,Metal Matrix Composites and Manufacturing processes

Ts. Mohd Hairizal bin Osman
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Dip.Eng.Tech. Mechanical-Manufacturing (IKMKL)
B.Eng.Tech. Tool and Die (UniKL IPROM) M.Eng. Manufacturing Systems Engineering (UPM)

Research interests:
Advanced Manufacturing, Tool & Die, Plastics Processing, Metal Fabrication

Ts. Norain binti Idris
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B.Eng. Mechanical (FACHHOCHSCHULE FRANKFURT AM MAIN)
M.Sc. Mechanical Eng. (UM)

Research interests:
Fire-retardant, Bio-composite, Bio- Technology

Dedicated Lecturers

Program: Technology in Industrial Machining (BMIM)

Head of Programme

Ts. Dr. Mohd Razali bin Md Yunos
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B.Eng. Mechanical Engineering (University of Bradford, UK)
M.Sc. Automotive Engineering (IIUM)
Ph.D. Manufacturing Eng. (UTeM)

Research interests:
Vehicle Dynamics, Manufacturing Technology, Technical and Vocational Education and Training (TVET)

Associate Professor Dr. Noraiham binti Mohamad
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B.Eng. Materials Engineering (USM)
Ph.D. Mechanical & Materials Engineering (UKM)

Research Interests: Rubber/Polymer Composites, Green Materials, Body Armour Materials, Nanoparticles Reinforcement

Associate Professor Ir. Dr. Raja Izamshah bin Raja Abdullah, CEng
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Cert. Computer Eng. (South Kent College, UK)
Dip. Mechanical Eng. (UTM)
B.Eng. Mechanical Eng. (UiTM)
M.Sc. Manufacturing Eng. (Univ. of Birmingham, UK)
Ph.D. Manufacturing Eng. (RMIT University, Australia)

Research interest:
CNC Machining, CAD/CAE/CAM, Cutting Tools

Associate Professor Ir. Ts. Dr. Mohd Hadzley Bin Abu Bakar
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B.Eng. Mechanic & Materials (UKM)
M.Eng. Advanced Manufacturing - Machining (UKM)
Ph.D. Manufacturing System (LSBU, UK)

Research interests:
Machining, Laser Processing, Powder Metallurgy, Ceramic, Surface Modification, TVET

Ts. Dr. Mohd Basri bin Ali
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B. Eng. Mechanical/System (UPM)
M. Eng Mechanical - Advanced Manufacturing Technology (UTM)
Ph.D. Mechanical & Material Engineering (UKM)

Research interests:
Impact Signal Analysis, Computer Aided Design, Mold Design (Plastic Injection Molding),

Ts. Dr. Nurul Ain binti Maidin
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B.Eng. Manufacturing Engineering-Design (UTeM)
M.Eng. Innovation & Engineering Design (UPM)
Ph.D. Mechanical Engineering (UPM)

Research interests:
Product Design & Development, Manufacturing Engineering

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Dip. Electronic Mechanical Engineering (National Institute of Technology, Oshima College, Japan)
B.Eng. Mechanical Engineering (Nagaoka University of Technology, Japan)
M.Eng. Mechanical Engineering (Nagaoka University of Technology, Japan)
Dr. Eng. Mechanical Engineering (Tokyo University of Agriculture and Technology, Japan)

Research interests: Manufacturing/Machining Process, Product Development, CAD/CAE/CAM

Associate Professor Ts. Dr. Umar Al-Amani Bin Azlan
umar@utem.edu.my

B.Eng. Materials Engineering (USM)
M.Sc. Advanced Materials (USM)
Ph.D. Electronic Materials (USM)

Research interests:
Electronic Materials, Advanced Materials, Materials Engineering

Dr. Rosidah binti Jaafar
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B.Eng. Mechanical Engineering (USM)
M.Eng. Mechanical Engineering (Advanced Manufacturing Technology) (UTM)
Ph.D. Mechanical Engineering (Product Design) (University of Leeds, UK)

Research interests:
CAD/CAM/CAE, Production Tool Design, TVET

Ts. Dr. Shaiful Anwar Bin Ismail
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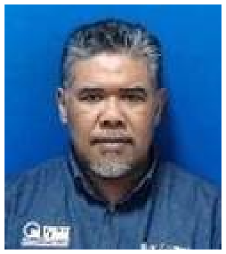
B.Eng. CAD/CAM Engineering (UM)
M.Sc. Advanced Manufacturing Technology and Materials Processing (UM)
Ph.D. Materials Science and Engineering (University of Sheffield)

Research interests:
Materials Processing, Manufacturing Process, CAD, Product Design



Ts. Dr. Hambali bin Boejang
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B. Mechanical Engineering (Pennsylvania State University,USA)
M.Sc. Rapid Product Development (De Montfort University, UK)
Ph.D. New Product Development (Concurrent Engineering) (UTeM)

Research interests:
Product Design & Development, Automotive Manufacturing Engineering, Concurrent Engineering, Time Compression Technologies (Rapid Prototyping, Tooling & Manufacturing, Reverse Engineering)

Dr. Shebeer A. Rahim
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B.Tech in Mechanical Engineering (Calicut University),
M.Tech in Mechanical Engineering (NIT Calicut),
PhD in Mechanical Engineering (NIT Calicut).

Research interest:
Materials Processing, Materials Characterization, Corrosion, and Metallic Biomaterials

Dr. Mohd Sanusi bin Abdul Aziz
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B.Eng. Mechanical Systems Engineering (Kanazawa University, Japan)
M.Eng. Mechanical Science and Engineering (Kanazawa University, Japan)
Ph.D. Innovative Technology and Science (Kanazawa University, Japan)

Research interests:
Mechanical System Engineering

Associate Professor Ir. Ts. Dr. Jeefferie bin Abd Razak, CEng
jeefferie@utem.edu.my

B.Eng. Materials Engineering (USM)
M.Eng. Materials Science & Engineering (Polymer Nanocomposites) (UPM)
Ph.D. Materials Science (UKM)

Research interests:
Polymer & Rubber, Polymer Composites Green Materials

Associate Professor Ir. Dr. Mohd. Amran bin Md. Ali
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Dip. Mechanical Engineering (UTM) B.Eng. Mechanical Engineering (UTM)
M.Eng. Manufacturing System Engineering (UPM)
Ph.D. Material Science & Engineering (Japan Advanced Institute of Science & Technology, Japan)

Research interests:
Machining, Mould & Die

Ts. Dr. Ismail bin Abu Shah
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B.Eng. Mechanical Engineering (Toyohashi University of Technology, Japan)
M.Eng. Manufacturing System Engineering (UPM)
Ph.D. Mechanical (UTM)

Research interests:
Damage Mechanics, Finite Element Analysis

Ts. Mohd Kamal bin Musa
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Dip. Mechanical Engineering (UTM)
B.Tech. Tool and Die (UTHM)

Research interests:
Product Design, Mold Design & Fabrication, Injection Molding Proces

Assoc. Prof. Ts. Dr. Rose Farahiyan binti Munawar
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B.Tech. Industrial Technology (USM) M.Sc. Industrial Technology (USM) Ph.D. Material Science (UKM)

Research interests:
Nanotechnology (Nanomaterials & Nanocomposite), Green Materials, Materials Characterization

Sharing Lecturers throughout programme

 **Assigned Program: BMIF**	**Professor Dr. Mohd. Rizal bin Salleh** rizal@utem.edu.my Dip. Mechanical Engineering (Suzuka National College of Tech., Japan) Adv. Dip. Mechanical Engineering (UiTM) M.Eng. Mechanical Engineering (University of Tokushima, Japan) Ph.D. System Engineering (Brunel University, UK) **Research interests:** Lean Manufacturing, Industrial Engineering, Metrology, Manufacturing Processes, Measurement Uncertainty, Agile Manufacturing
 **Assigned Program: BMIG**	**Associate Professor Dr. Zaleha binti Mustafa, CEng.** zaleha@utem.edu.my B.Eng. Materials Engineering (USM) M.Sc. Biomaterials (Queen Mary, University of London, UK) Ph.D. Mechanical Engineering (University of Glasgow, UK) **Research interests:** Biomaterials, Polymer Composite, Fatigue Analysis

 **Assigned Program: BMIG**	**Professor Ir. Ts. Dr. Mohd Shukor bin Salleh, CEng** shukor@utem.edu.my B.Eng. Manufacturing Engineering (UKM) M.Sc. Manufacturing Systems Engineering (Coventry University, UK) Ph.D. Mechanical and Materials Engineering (UKM) **Research interests:** Semisolid metal processing, Casting, CNC Machining, Manufacturing System Engineering.
 **Assigned Program: BMIF**	**Associate Professor Ir. Dr. Mohamad bin Minhat** mohdm@utem.edu.my Dip. Industrial Technology (KUSZA) B.Eng. Mechanical & Manufacturing (Cardiff University, UK) M.Sc. Engineering & Manufacturing Management (Coventry University, UK.) Ph.D. Manufacturing Engineering (University of Auckland, N.Z.) **Research interests:** Manufacturing Process

 **Assigned Program: BMIG**	**Ts. Dr. Rahimah binti Abdul Hamid** rahimah.hamid@utem.edu.my B.Eng. Mechanical Engineering (KUiTTHO) M.Sc. Production Systems Engineering (RWTH Aachen, Germany) Ph.D. Intelligent Structures and Mechanics Systems Engineering (Tokushima University, Japan) **Research interests:** Additive Manufacturing, Sustainable Manufacturing, Product Development, Polymer Composite
 **Assigned Program: BMIF**	**Associate Professor Dr. Zuhriah binti Ebrahim, CEng.** zuhriah@utem.edu.my B.Eng. Mechanical Engineering (UTM) M.Sc. Engineering and Manufacturing Management (Coventry University, UK) Ph.D. Manufacturing Engineering (Cardiff University, UK) **Research interests**: Productivity Improvements, Performance Measures, Lean Six Sigma, Sustainable Manufacturing
 **Assigned Program: BMIF**	**Ts. Dr. Mohd Nazmin bin Maslan** nazmin@utem.edu.my B.Eng. Mechanical Engineering (Universiti Teknologi Petronas) M.Eng. Mechanical Engineering (UTM) Ph.D. Mechano-Micro Engineering (Tokyo Institute of Technology) **Research interests:** Control system

 **Assigned Program: BMIG**	**Dr. Chang Siang Yee** changsy@utem.edu.my B.Eng. Manufacturing Engineering (Material Engineering) (UTeM) M.Sc. Materials Engineering (USM) Ph.D in Mechanical Engineering (University of North Carolina at Charlotte, USA) **Research interests:** 1D Nanostructures; Mechanical Testing; Microscopy Techniques
 **Assigned Program: BMIG**	**Hazman bin Hasib** hazman@utem.edu.my B. Eng. Manufacturing Engineering (Manufacturing Process) (UTeM) M.Sc. Industrial Engineering (North Carolina State University, USA) **Research interests:** Rapid Manufacturing; 3D Modeling, FEA; CAD; Product Design
 **Assigned Program: BMIF**	**Ts. Dr. Al Amin bin Mohamed Sultan** alamin@utem.edu.my B.Eng. Manufacturing (Manufacturing Management) (UTeM) M.Eng. Industrial Engineering (UTM) Ph.D. Mechanical Engineering (Sustainable Manufacturing) (University of Manchaster, UK) **Research interests:** Operations Management

Assigned Program: BMID

Ts. Dr. Amir Hamzah bin Abdul Rasib
amir.hamzah@utem.edu.my

Ass.Degree Electrical Engineering (Gunma National College of Technology, Japan)
M.Sc. Quality and Productivity Improvement (UKM)
Ph.D. Manufacturing Engineering (UTeM)

Research interests:
Manufacturing Operational Performance Measures, Manufacturing Quality System, Manufacturing System

Assigned Program: BMIW

Ts. Dr. Ihwan Ghazali
ihwan@utem.edu.my

B.Eng. Industrial Engineering (University of Ahmad Dahlan, Indonesia)
M.Eng. Resources Engineering (University of Gadjah Mada, Indonesia)
Ph.D. Industrial Engineering (UM)

Research interests:
Sustainability, Green Manufacturing, Industrial Engineering, Cultural and engineering related study, sustainable development, Green product design

Assigned Program: BMIP

Assoc. Prof. Dr. Mohd Edeerozey bin Abd Manaf
edee@utem.edu.my

B.Eng. Electronics Engineering (University Of Kyoto, Japan)
M. Sc. Advanced Materials, Process & Manufacturing (University Of Hull, UK) Ph.D. Materials Science (JAIST, Japan)

Research interests:
Functional Polymers, Polymer Composites, Green Materials

Assigned Program: BMIP

Dr. Mohd Shahadan bin Mohd Suan
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B.Eng. Materials Engineering (USM)
M.Sc. Materials Engineering (USM)
Ph.D. Materials Engineering (UM)

Research interests:
Superconductor, Nanomaterials,Electroceramics, Advanced Materials

Assigned Program: BMIW

Dr. Nur Aidawaty binti Rafan
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B.Eng. Mechanical Engineering (Universiti Teknologi Petronas)
M.Eng. Manufacturing Engineering (UM) Ph.D. Control Engineering (UTeM)

Research interests:
Systems and Control; Mechatronics; Industrial Automation

Assigned Program: BMIM

Professor Ir. Dr. Mohd Asyadi 'Azam bin Mohd Abid, CEng
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B.Eng. Material Science & Engineering (Shibaura Institute of Technology, Japan)
M.Eng. Material Science & Engineering (Shibaura Institute of Technology, Japan)
Ph.D. Materials Science (Japan Advance Institute of Science & Technology, Japan)

Research interests:
Carbon Nanotube Growth and Characterization, Carbon Nanotube Device, Energy Storage Device, Thin Films, Corrosion Science and Engineering.

Assigned Program: BMIM

Professor Ir. Ts. Dr. Sivarao a/l Subramonian
sivarao@utem.edu.my

B.Eng. Mechanical – Manufacturing Engineering (UTM)
M.Eng. Mechanical Engineering (Multimedia University)
Ph.D. Mechanical Engineering (Multimedia University)

Research interests:
System Engineering

Assigned Program: BMIK

Dr. Toibah binti Abd Rahim
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B.Eng. Material (International Islamic University Malaysia)
M.Eng. Material (International Islamic University Malaysia)
Ph.D. in Mechanical Engineering (Toyohashi University of Technology, Japan)

Research interests:
Ceramic, Biomaterials, Thermal Spray Coating, Materials Characterization

Assigned Program: BMIK

Mohamad Nizam bin Ayof
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B.Sc. Industrial Physics (UTM)
M.Sc. Physics (UTM)

Research interests:
Physics

Assigned Program: BMIK

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BAA Design Technology (UNIMAS)
M.Sc. Automotive Engineering (University of Hertfordshire, UK)
Ph.D. Material and Structure (University of Hertfordshire, UK)

Research interests:
Dynamic Impact, Product Design

Assigned Program: BMIK

Dr. Dzieda binti Muhamad Parid
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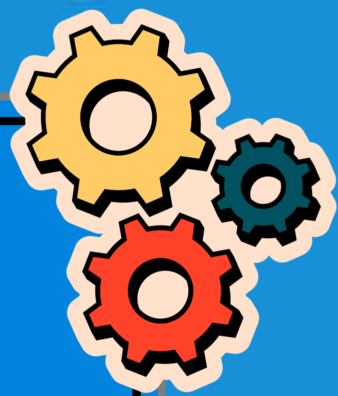
Bachelor of Chemical Engineering Technology (Hons) Food (UNIKL MICET)
Master of Science (Food & Process Engineering) (UPM)
Ph.D. Food Engineering (UPM)

Research Interests:
Additive Manufacturing, 3D printing, Material mechanics, Engineering simulation, Extrusion system design, Sensor integration

STAFF DIRECTORY

Technical



Senior Assistant Engineer

Assistant Engineer

Senior Assistant Engineer

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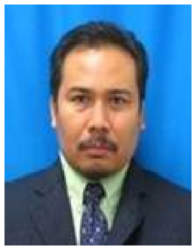
(Pusat Latihan Teknologi Tinggi-Batu Pahat)



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Diploma of Mechanical (Automotive) (Kota Baharu Polytechnic)

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Diploma Kemahiran Malaysia - Production (Batu Pahat, ADTEC)

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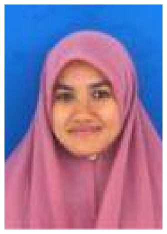

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Electronic Certificate (Giatmara) AOChargemanCertificate(Energy Commission) SHO (Niosh) Course certificate

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Dip. of Mechanical Engineering (Manufacturing) (Politeknik Sultan Abdul Halim Muadzam Shah)

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Cert. Tech. Mechanical Engineering Manufacturing (IKM Johor Bharu)
Dip. Tool And Mould Making & Design (Tooltronic- MARA)

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Industrial Dip. Production Technology (Mould Technolgy) (GMI)

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Dip. Machining Technology (ADTEC)

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Dip. Mechanical Engineering (Politeknik Port Dickson)

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Dip. Manufacturing Engineering (UTeM)

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Dip. Mechanical Engineering (Manufacturing) (Politeknik Port Dickson)

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Bachelor in Manufacturing Management with Honour, (OUM)
Master of Manufacturing Engineering (System Manufacturing), UTeM

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Diploma Pengajar Vokasional Kebangsaan (CIAST)

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Sijil Pelajaran Malaysia (SPM)

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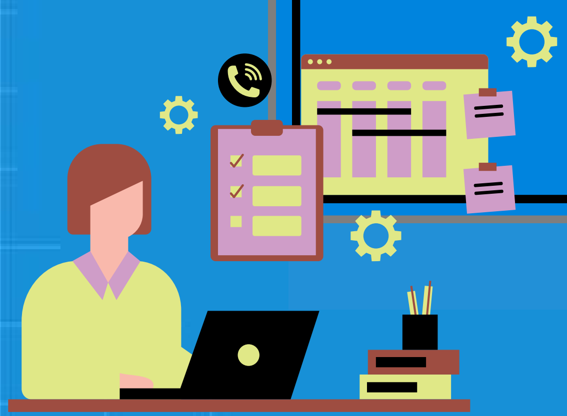
Malaysian Skill Certificate (SKM) Level 4
Dip. Malaysian Skill Welding Technology & Fabrication – Fabrication Management (Welding)

STAFF DIRECTORY

Administration

Deputy Registrar
Senior Assistant Registrar
Assistant Registrar
Assistant Administrative Officer
Administrative Assistant (Secretarial)
Chief Administrative Assistant
Senior Administrative Assistant (Clerical)
Administrative Assistant (Clerical)
Operation Assistant



Deputy Registrar

Mohamad Yusof Bin Mohamad Dan
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Bachelor of Management (Honours) (UiTM)

Senior Assistant Registrar

Syahira Binti Mohd Adnan
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Bachelor of Indsutrial Technology (Quality Control & Instrumentation) (USM)

Fadzlin binti Amzah
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Bachelor of Human Sciences (Political Science) (IIUM)
MBA (Technology & Innovation Management) (UTeM)

Assistant Registrar

Norfarahin Binti Amzah
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Bachelor of Computer Sciences (Database Management) With Honours (UTeM)

Assistant Administrative Officer

Nurhana Binti Alias
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Diploma in Public Administration - UiTM
Bachelor of Administrative Science (Honours) - UiTM

Aghniya binti Mohamad
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Diploma in Accountancy (Politeknik Merlimau)

Administrative Assistant (Secretarial)

Nurhayati binti Mohd Shariff
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Diploma in Secretarial Science (UiTM)

Chief Administrative Assistant

Abdul Rahman Rosli bin Mahmood
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Sijil Tinggi Pelajaran Malaysia

Senior Administrative Assistant (Clerical)

Siti Rohani binti Manan
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Norlizawati binti Ab Rahaman
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Bachelor of Economics with Honours (UUM)

Operation Assistant

Khairul Muzani Bin Osman
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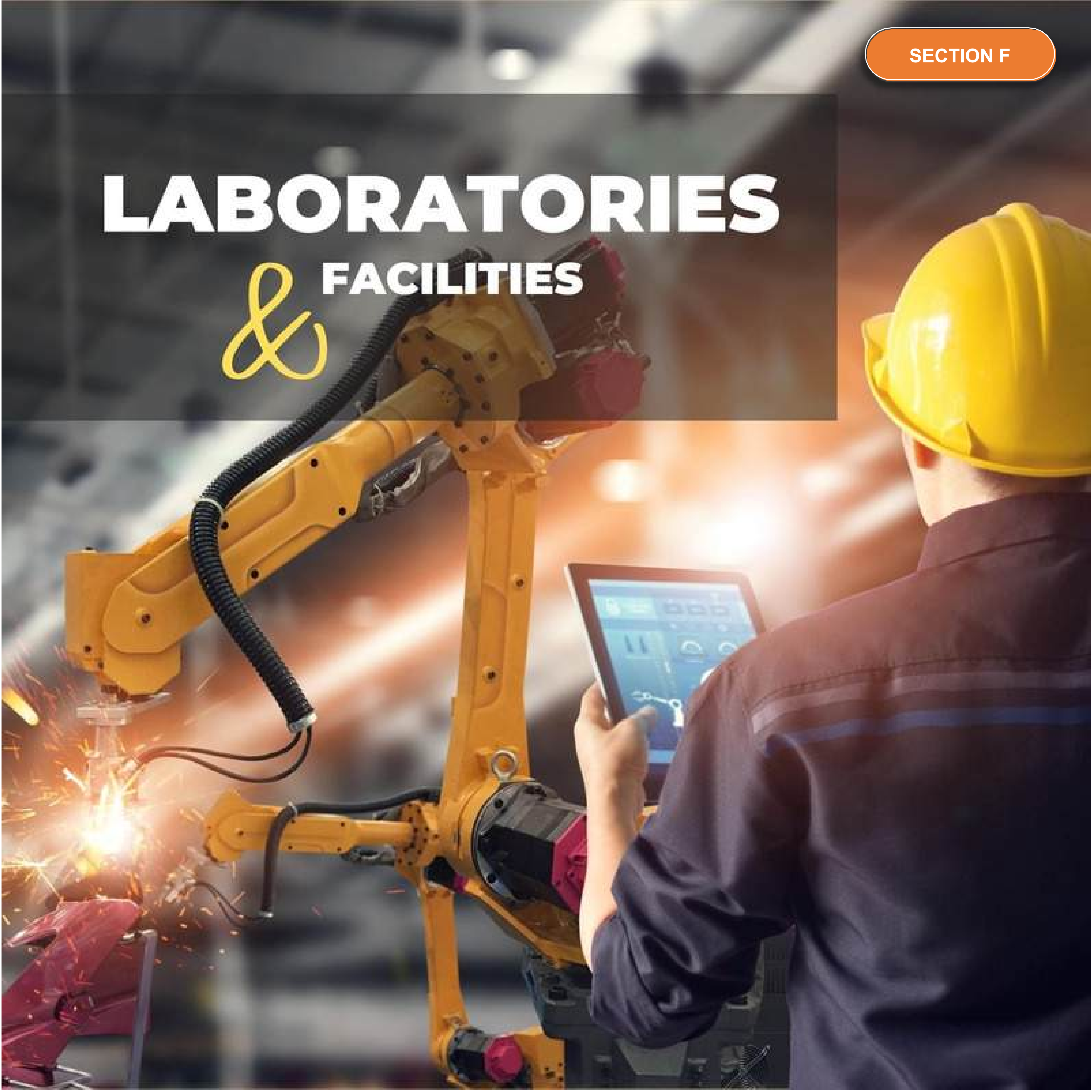
Sijil Pelajaran Malaysia

SECTION F

LABORATORIES & FACILITIES

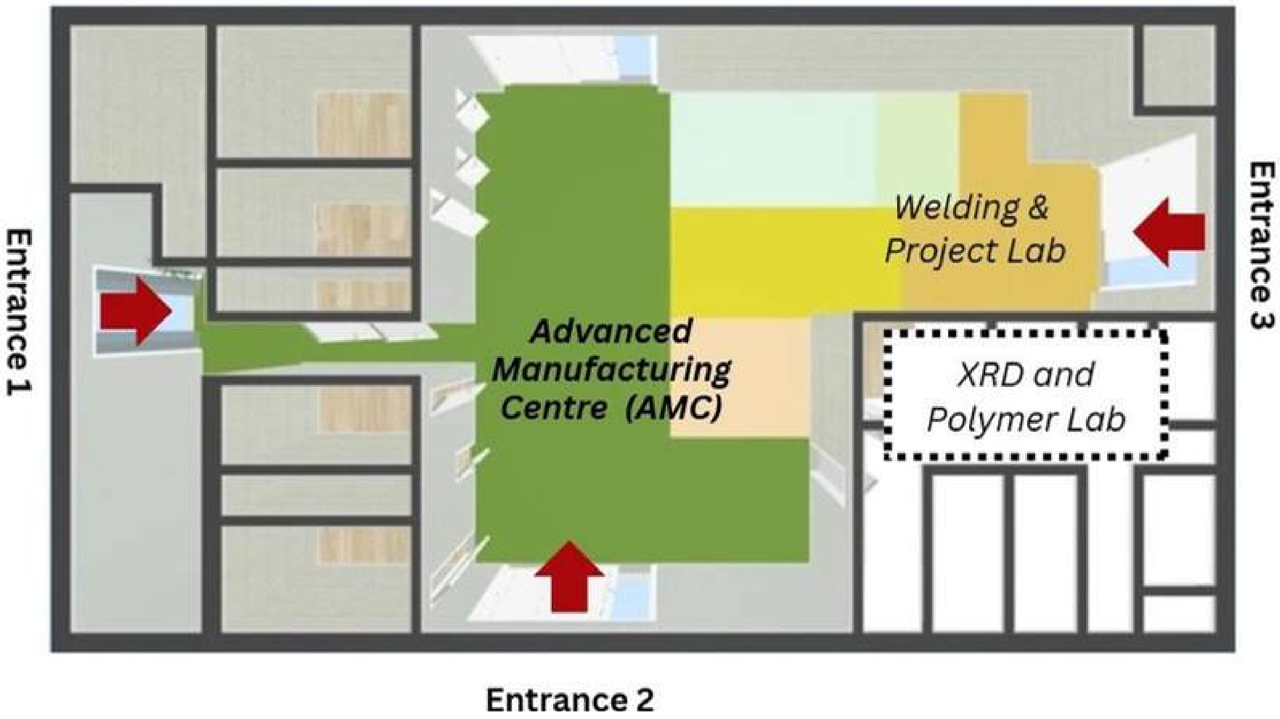


Laboratories

The Faculty has developed the laboratories suitable with subjects offered for the courses. Through these laboratories, students are exposed to related machine usage experience as well as practical exposure on processes involved in production in effort to prepare themselves to become not only a knowledgeable engineer but also highly competitive in application and technical aspects.

Each laboratory is advised by an academic staff lab advisor. The lab management is also supported by technical support staff led by an assistant engineer. The tools, machines and equipment of each laboratory are developed by the departments. The lab management is responsible to the daily usage, consumables and maintenance of the labs.

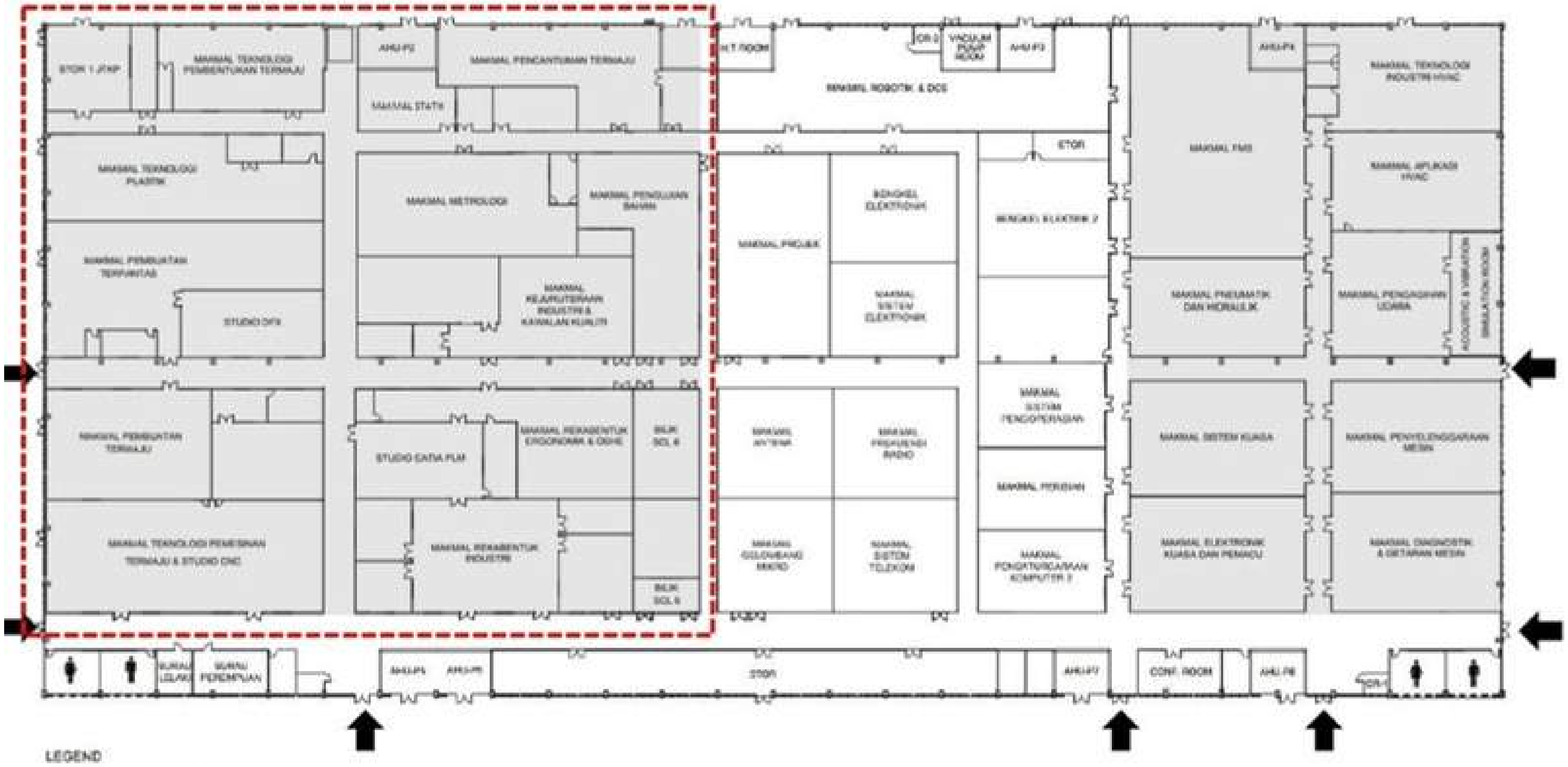
FTKIP Labs at Main Campus



FTKIP Labs at Main Campus (PFI B)

FTKIP Labs at Technology Campus

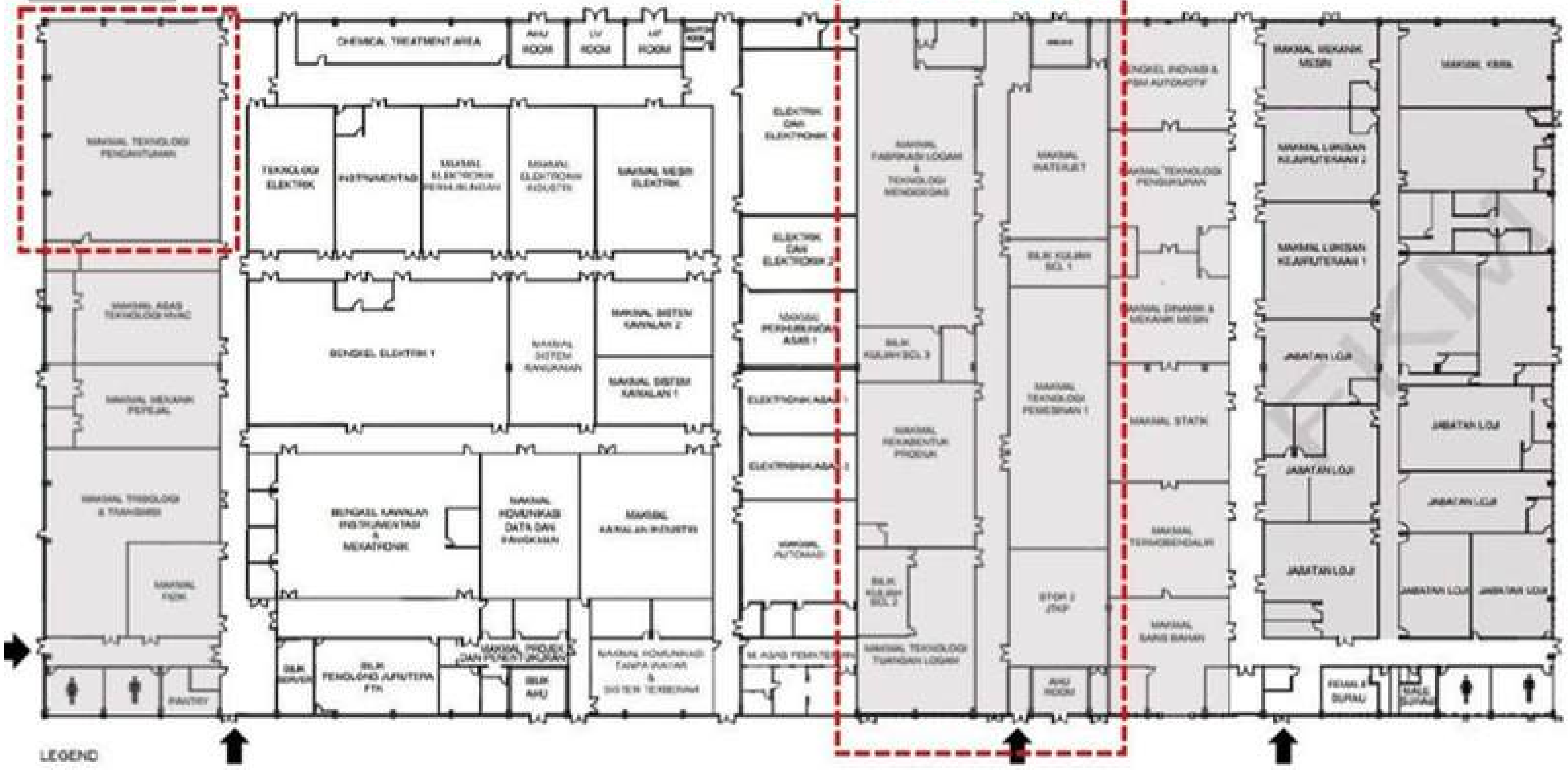
FACTORY 1



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
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
ZON F
ZON G
ZON H
ZON I
ZON J

List of Machines / Equipments

Venue: FTKIP
Block A

Machine Shops Lab

Machine / Equipment

- Turret Milling (Bridgeport)
- Boring machine (Gate)
- Universal Milling Machine (Holke)
- Lathe machine (Momac)
- Surface Grinding (Gate)
- EDM Die Sinking (SODDICK)
- CNC Turning Center (HAAS)
- CNC Milling (DMG)
- General equipment
- Pedestal Drilling Machine
- Belt Sander Machine

Metal Sheet and Joining Lab

Machine / Equipment

- Welding fume system *(Software: Weld Trainer)*
- Spot welding
- Arc, MIG, &TIG Welding
- Robotic Welding (OTC& KUKA)
- CNC Press Brake (AMADA)
- Hydraulic Shearing Machine (VIKING)
- Friction Stir Welding
- CO2 Laser Processing Machine (MITSUBISHI) (Software: SigmaNEST)
- Laser Cutting Machine (LVD) *(Software: CADMAN-P)*

Manufacturing Design and Innovation Lab

Machine / Equipment

- Turret Multimedia Computer Set *(Software: SolidWork 2017, Inventor 2017)*
- UPS for PC *(Software: Inventor 2017)*
- PC Workstation *(Software: AutoCAD 2023, ANSYS 2022, Sima Pro)*

Computer Aided and Process Planning Lab

Machine / Equipment

- HP Colourlaserjet 5500 *(Software: Catia V5R19)*
- HP Designjet 800
- Multimedia computer set
- General equipment
- PC Workstation *(Software: DFMA)*
- Z-Corp 3D Printer *(Software: Sima Pro)*
- 3D Printers
- Vacuum Casting System General equipment

Robotics and Control Lab

Machine / Equipment

- Computers *(Software: MATLAB)*
- UPS
- General equipment
- ABB Rhino Robot
- ABB Parallel Robot
- MTAB Robot
- COMAU Robot System
- Yaskawa Motoman
- Senes Robo 005

Advanced Mechatronic and Automation Lab

Machine/Equipment

- Pneumatic Equipment *(Software: Omron CP1E)*
- Pneumatic workbench
- PLC Siemens *(Software: Workspace, Industrial Automation)*
- Conveyor
- XY Table
- Sliding Rail Kit
- Warehouse Robot
- Server Robot
- Bveeta Autonomous Mobile Robot
- ElephantRobotics Robot
- Mechatronic related machines

Venue: FTKIP Block B

Metrology Lab

Machine / Equipment

- CMM Inclusive PC and Printer (WENZEL)
- Horizontal Comparator
- Vertical Comparator
- Digital Height Measuring Station
- CNC Roundness Measuring System (MAHR)
- Universal Measuring Machine (MAHR)
- Portable Surface Roughness
- Stereo Microscope *(Software: Vis Pro)*
- Mitutoyo granite surface table

Advanced Precision Machining Lab

Machine / Equipment

- CNC Milling (HAAS & DMG) *(Software: CNC Train (Cutting Tool Path Simulator))*
- CNC Wirecut (MITSUBISHI)
- EDM Die Sinking (SODDICK)
- CNC Turning Center (HAAS)
- Ultrasonic Tool Holder System
- Multi Component Force Sensor/Kristler & Digital Signal Processing
- Refrigerated Air Dryer
- Micro CNC Lathe & Milling
- Thermal Imager
- Cryogenic Cooling System
- Fiber Laser Engraving Machine
- Table Top Laser Cutter
- Table Top CNC Lathe & Milling

Modelling Simulation and Quality Control Lab

Machine / Equipment

- 30 computers (Software: Minitab Statistical)
- EVSM v7
- 40 computers (Software: Witness simulation software)
- 30 computers (Software: CNC Simulator
- ANSYS Granta)

Nano Material Tech Lab

Machine / Equipment

- Chemstore Ducted Chemical Storage
- Fume Cupboard
- Ultrasonic Bath
- Scanning Electron Microscope
- Reflected Light Optical Microscope (LEICA)
- Universal Testing Machine
- Rockwell Hardness Tester Wizhard (Mitutoyo)
- Stiffness Apparatus:(TE 16)
- RAMAN
- Particle Size Analyzer
- FTiR machine (JASCO)
- UV-Visible
- Table top XRD machine (RIGAKU)

Sustainable Advanced Materials Tech Lab

Machine / Equipment

- Crusher
- Horizontal Ball Mill
- PVD Coating VAC-TEC
- Furnaces
- Oven
- Tube Furnace
- Pin On Disk
- High Energy Planetary Ball Mill
- Planetary Ball Mill
- Lab Station with Measuring Extruder and Internal Mixer
- Hydraulic Hot Press (Auto) and (Manual)
- Equipment For Experiment On Viscosity For Newtonian & Non Newtonian Liquids
- Equipment For Experiment On Dielectric Constant Of Different Materials
- Equipment For Experiment On RLC Measuring Bridge
- Equipment For Experiment On Torsional Vibrations And Torsion Modulus
- Equipment For Experiment To Measure The Velocity Of Light
- Equipment For Experiment To Determine Surface Tension Using The Ring Method
- Mini Sputter Coater SC 7620
- Water Deionizers L-Series Model
- Digital gas flow meter for nitrogen gas
- Water Distiller Favorit W4L
- Memmert Oven, Germany Model : UF110
- Waterbath WNB22 C/W Sloping Cover 22L
- Stirring Mantel 500ml
- Tablet Hardness Tester (Portable)

Ergonomic and Industrial Engineering Lab

Machine / Equipment

- Prototype Assembly Line
- Digital Stopwatch
- Surface & Handheld Electromyography
- Motion Capture System
- Classic Human Eye Model
- Digital Sound Level Meter
- Flicker Fusion
- Production Assembly Simulation

Venue: PFI B – TP

Project Laboratory 1

Machine / Equipment

- X-Ray Difractometer

Project Laboratory 2

Machine / Equipment

- Arc, MIG, &TIG Welding
- Casting Furnace
- Casting training kits
- Lathe
- Milling

Venue: Factory 1, Technology Campus

Metrology Lab

Machine / Equipment

- Angle Dekkor Manual/Bs Pyromatic/Bspl-Mtr-03034
- Granite Surface Plate/ Premium
- Gauge Block Set- Steel
- Horizontal Optical Comparator
- Vertical Optical Comparator
- Portable Surface Roughness Measuring Machine
- Gauge Block And Gauges Set
- Brand : Mitutoyo
- Granite Table C/W Stand
- Brand : Premium
- Vernier Caliper
- Brand/Model : Mitutotyo 530-14
- Screw Thread Micrometer
- Brand : Mitutotyo
- Digitsl Level Meter
- Brand/Model : Digipas Dwl600f
- Dial Indicator
- Brand/Model : Mitutotyo 2044s
- Dial Gauge Stand
- Brand/Model : Mitutotyo 7007-10
- Roundness Form Tester
- Coordinate Measuring Machine (Cmm) System
- Toolmaker Microscope
- Dehumidifier
- Screw Thread Micrometers Mitutoyo
- Handysurf E-35b 2umr Stylustip
- Micrometer Stand
- Sine Bar

Rapid Prototyping Lab

Machine / Equipment

- Handheld Surface Roughness Tester - Ipx 104
- Liquid Based Layer Manufacturing System
- Solid Based Layer Manufacturing System
- Reverse Engineering And Inspection Machine
- Rapid Tooling System

Statics Lab

Machine / Equipment

- Gunt/EM049/Germany/Equilibrium Of Moments On A Two Arm Lever
- Gunt/TM115/Germany/Forces In A Crane Jib
- Gunt/FL111/Germany/Full Forces In A Simple Bar Structure
- Gunt/TM110/Germany/Fundamentals Of Statics
- Gunt/SE110.53 + SE112/Germany/ Equilibrium In A Single Plane Statically Determinate System

Project Lab

Machine / Equipment

- Lathe Machine Optimum / D420x1000dpa
- Robotic Arm Cnc - Kuka Kr 10 R1100 Sixx

Ergonomic Design and OSHE Lab

Machine / Equipment

- Anthropometric Kits
- Sound Level Meter
- Indoor Air Quality Meter
- Thermal Comfort
- Digital Lux Meter
- Handgrip And Pressure Measurement System
- Seating And Positioning Pressure Measurement System
- Calibrator Seating And Positioning Pressure Measurement
- 5 Ergonomic Chair
- Electromography (Emg) Wireless Measurement System - Delsys Trigno Wireless Systems With 16 Ch Sensor & Emg Works 4.0
- Portable Emg Wireless Data Logger - Delsys Trigno Mobile
- Mobile Workstation Compatible With Wireless Emg System & Emgworks - Dell Precision 17 7000 Series Mobile Workstation

Industrial Design Lab

Machine / Equipment

- Wood Band Saw
- Brand : Jet
- Model : Jwbs-14
- Disc Sander Machine
- Brand : Jet
- Model : Jds-12
- Drill Presses
- Brand : Jet
- Model : Jdp-17f
- Working Station
- Sanding Booth
- Vacuum-Forming Machine
- Softbox For Continous Light
- Continous Light System
- Continous Light Stand
- Wireless Remote Control Trigger
- Background (Black , Green, White)
- Profesional Studio Flash Light Strobe
- Flash Light Stand
- Barn Door Set With 4 Set Filters
- Light Studio Reflector Set

Advanced Manufacturing Technology Lab

Machine / Equipment

- CNC Milling Machine *(Software: Training Simulator C/W Console & Milling & Turning Software)*
- Tool Presetter *(Software: CAD/CAM Software - Delcam/ Turnmill)*
- 9-Axis Cnc Turnmill Machine - Dmg Mori Seiki/Ntx 1000
- High Speed 5-Axis Cnc Milling Machine - Deckel Maho Dmu 60 Evo
- Standalone Post-Processor - Customization Post Processor

Material Testing Technology Lab

Machine / Equipment

- Fatigue Testing System
- Controller
- Power Amp Servo
- Air Compressor
- Air Receiver
- Air Dryer
- Arc Atonomic Emission Spectrometer System
- Temperature And Humidity Chamber
- Thermogravimetric Analyzer
- Digital Ultrasonic Flaw Detector
- Dye Penetrant Testing
- Radiography Interpretation
- Digital Ultrasonic Flaw Detector
- Magnetic Particle Inspection With Booth-Uv Light
- Radiography Interpretation
- Eddy Current
- Ac/Dc Magnetic Yoke
- Photometer And Radiometer
- Bench Unit Magnetic Inspection Unit
- 50 Kn Universal Testing System
- Capillary Rheometer System
- Personal Computer
- 100 Kn Universal Testing System - Shimadzu Ag-100kn Plus
- Black & White Laser Jet Printer - HP M401DN
- Microhardness Testing System - Matsuzawa Mmt-X7 Type A -Japan
- Impact Testing Equipment :Victor/Vir50c Malaysia
- Impact Tester-Included
- V-Notch Sampling Machine-Included Victor/Vir20a Malaysia
- Storage And Machine Stand-Included

Plastic Technology Lab

- Electric Injection Molding System
- Portable Water Chiller
- Set Two Plate Mold
- Set Three Plate Mold
- Astm 638 Test Specimen Mold
- Overhead 'A' Frame Crane
- Plastic Granulator
- Lifting Trolley
- Hopper Dryer And Auto-Loader
- Sprue Picker (Swing Type)
- Color Mixer (Resin Blender)

Industrial Engineering and Quality Control Lab

Machine / Equipment

- MTA Kando Lean *(Software: Enterprise Suite Academic (Education License)*
- Mta Kando Lean Expansion Pack *(Software: Professional Edition Simulation Software)*
- *Software: License Gabi 6 Academy (Perpetual) Including Training*
- *Software For Advanced Plastics Injection Molding Simulation*

CATIA PLM Studio

Machine / Equipment

- HP Dl380G8 *(Software: Delmia Manufacturing Master)*
- Aten Cl5708 8-Port Slideaway Lcd Kvm Switch *(Software: CATIA Design Master)*
- Apc Smart-Ups 3000va USB & Serial Rm 2u 230v *(Software: PLM V6 For Academia)*
- Cpu System And Accessories
- Interactive Pen Displays
- Computer Table
- Industrial Plotter (Print & Cad Cut)
  Coreldraw Graphics Suite 2017 Education Lic (Latest Version)

Studio DFX

Machine / Equipment

- Computer Workstation *(Software: Advanced Casting Simulation)*
- 3D Mouse: Space Pilot Pro

Advanced Joining Technology Lab

Machine / Equipment

- Non Inverter Resistance Spot Welder
- Inverter Resistance Spot Welder
- Robotic Welding Machine
- Welding Simulator - Soldmatic Welding Simulator
- Education Friction Stir Welding - Flamefast / Unimeld FSW2-100

Venue: Factory 2, Technology Campus

Metal Fabrication and Fitting Technology Lab

Machine / Equipment

- Table Saw Machine
- Manual Press On Floor Type
- Oxygen Cutting M/C With Stencil
- Swage Block
- Pedestral Drilling Mc
- Swage Block
- Anvils Double-Bick C/W
- Anvils Single-Bick C/W Stand
- Vertical Band Saw
- 2 Tonne Folding Mobile Crane
- Hydraulic Pipe Bender
- Sand Blasting Machine - Compak Dry 9070
- Planishing Hammer / Power Hammer
- English Wheel
- Heavy Duty Guillotine Shearing Machine
- Combination Shear, Brake And Roll Machine
- Combination Shear, Brake And Roll Machine
- Bench Hand Brake
- Foot Shear
- Bench Rotary Machine
- Hand Notcher
- Manual Slip Rolls
- Plate Rolls Machine
- Workbrench C/W Vise
- Surface Table
- Belt Sanders
- Floor Pillar Drilling Machine
- Drill Stand 60mm Drilling Depth

Product Design Lab

Machine / Equipment

- Floor Standing 3d Printer (Software: Solidworks Educational Edition 2011/2012 Or Latest)
- Desktop 3d Printer (Software: Catia V5R21)
- Portable 3d Scanner/Z Corp Model Zscanner (Software: Design Software Package - 3d System/ Cubify)
- Dell Precision M6700
- Computer Workstation
- 3d Mouse:Space Pilot Pro
- Ultimate Series Surge Protector
- Up Plus 2 3d Printing System
- MAC/Windows OS 3d Scanner - 3d System/ Sense
- iOS 3D Scanner - 3d System / Isense
- 3D Printer For Mac - 3d System/ Cubepro Duo

Machining Technology Lab 1

Machine / Equipment

- Tool Sharpener Machine
- Heavy Duty Conventional Lathe Complete With 2-Axis Dro
- Fullmark Fm-16vs
- Surface Grinding (Proth Psgs-4080ahr)
- Pedestal Grinder (Creusen)

Joining Technology Lab

Machine / Equipment

- Variable Speed Series Drill Press
- Pedestral Drilling Mc
- Engine Driven Welding Set
- Horizontal Band Saw Machine
- Fume Extraction System
- Detachable Metal Welding Bay
- Local Exhaust Ventilation (Lev)
- Dry Painting Booth
- Tig Portable Welding
- Shop Electrod Oven, Weldro Ke150 Ms
- Shielded Metal Arc Welding (SWAW), Kemppi Master 3500 Mls
- Tungsten Inert Gas Welding (TiG), Kemppi Master Tig 4000 Mls
- Metal Inert Gas Welding (MiG), Kemppi Fast Mig Km400
- Cmd Worm Reducer Gear Box(10:1)120(China)
- Inverter (5.5hp) 3 Phase Motor (China)
- AC Motor Driver 5.5 Hp 4 Pole Foot-Maunted

Metal Casting Technology Lab

Machine / Equipment

- Resistive Heating Furnace
- Local Exhaust Ventilation
- Sand Rammer
- Pneumatic Ejector
- Digital Permeability Tester
- Universal Precision Temperature Measurement
- Electrically Heated Chamber Furnace - Neberhterm / Lh216/14 / Controller B150 / Software Controltherm Mv1.5 / Accessories
- Digital Microscopy Image Analyser System (Berserta Komponen)
- Workstation - Hp / Hp Z440 Workstation
- Avr
- Thermal Imaging System - Fluke Ti400
- Multi-Function Precision Balance - A&D Gx-6100
- Image Capture Analysis And Data Storage System - Apple/Ipad

Waterjet Lab

Machine / Equipment

- Newair Air Dry Unit

Venue: Factory 3, Technology Campus

VR Studio
Machine / Equipment
1 - VR HEAD MOUNTED DISPLAY(HMD)/VR GOGGLE - 6 UNIT
2 - COMPUTER WORKSTATION (PC) - 5 UNIT
3 - LAPTOP - 1 UNIT
4 - INTERACTIVE SMART TV 86 INCH
5 - INTERACTIVE PROJECTOR
6 - 86 INCH 4K SMART TV

Technology Art Laboratory (NDT)
Machine / Equipment
1 - MAGNETIC YOKE - 1 UNIT
2 - UV LIGHT - 1 UNIT

Industrial Machining Laboratory 3 (MIP3)
Machine / Equipment
1 - FANUC 3 AXIS CNC MILLING (1 UNIT)
2 - DAHLIH 3+2 CNC MILLING (1 UNIT)
3 - DS LYNX CNC TURN-MILL (1 UNIT)
4 - TSUGAMI CNC LATHE (1 UNIT)
5 - VMTCNC SURFACE GRINDING (1 UNIT)
6 - MASTIKA HORIZONTAL BEND SAW (1 UNIT)
7 - RENAN MACHINING SIMULATOR (1 UNIT)

Machining Analysis Studio
Machine / Equipment
MASTERCAM SOFTWARE (31 UNITS)

Industrial Machining Laboratory 1
Machine / Equipment
FDM 3D PRINTER MACHINE

Industrial Machining Laboratory 2
Machine / Equipment
FURNACE

Welding Quality Laboratory (MKW)
Machine / Equipment
1 - ULTRASONIC FLAW DETECTOR-6 UNIT
2 - ULTRASONIC TESTING THICKNESS MEASUREMENT (UTTM)-1 UNIT
3 - TWI TRAINNING PLATE- 25 PCS
4 - TWI TRAINNING FILLET-25 PCS
5 - PIPE BUTT- 25 PCS
6 - CHEMICAL STORAGE- 1 UNIT

Technology Art Laboratory (Rapid Prototype)
Machine / Equipment
1 - METAL 3D PRINTING

Welding Characterization and Metallurgical Laboratory (MMP)
Machine / Equipment
1 - DIGITAL MICROSCOPE X 1 UNIT
2 - MICROHARDNESS MACHINE X 1 UNIT

Non Conventional Welding Lab
Machine / Equipment
1 - TV 75"'
2 - SCREEN LCD PROJECTOR
3 - GRINDING & POLISHING MACHINE X 2 UNIT
4 - HOT MOUNTING X 1 UNIT
5 - ABRASIVE CUTTER X 1 UNIT

Industrial Laser Laboratory
Machine / Equipment
1 - HANDHELD AND PORTABLE ARM SYSTEM
2 - ROBOT LASER WELDING SYSTEM AND ACCESSORIES
3 - LASER OBSTACLE REMOVER

Welding Analysis Studio (SAK)
Machine / Equipment
1 - VR HEAD MOUNTED DISPLAY(HMD)/VR GOGGLE - 6 UNIT
2 - COMPUTER WORKSTATION (PC) - 5 UNITL
3 - LAPTOP - 1 UNIT
4 - INTERACTIVE SMART TV 86 INCH
5 - INTERACTIVE PROJECTOR
6 - 86 INCH 4K SMART TV

Technology Art Laboratory (Welding)
Machine / Equipment
1 - SHIELDED METAL ARC WELDING (SMAW) MACHINE X 4 UNIT
2 - TUNGSTEN INERT GAS (TIG) WELDING MACHINE X 3 UNIT
3 - WELDING MONITORING SYSTEM X 2 UNIT
4 - METAL INERT GAS (MIG) WELDING SYSTEM X 2 UNIT
5 - BEVELING MACHINE X 1UNIT

Innovation and FYP Laboratory
Machine / Equipment
1 - HP Z620 WORKSTATION (38 UNITS) (SOLIDWORK,CATIA V5,CATIA V6,DFMA,INVENTOR)
2 - LCD PROJECTOR
3 - SCREEN LCD PROJECTOR
4 - 3D MOUSE : SPACE PILOT PRO X 38 UNITS

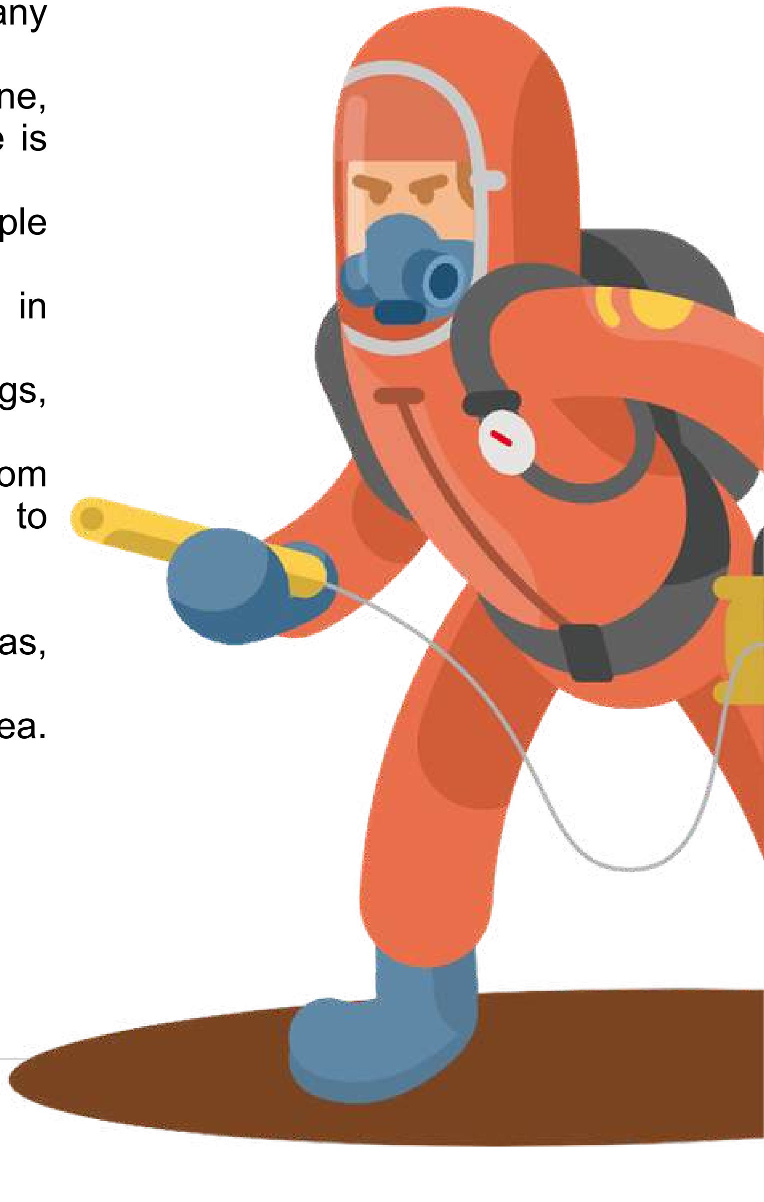
Composite and Surface Treatment Lab
Machine / Equipment
• FULL HEIGHT CUPBOARD WITH STEEL SWINGING DOOR TYPE K1
• VACUUM INFUSION SYSTEM - D7S-30 TUBING ROLER MOLD SYSTEM VAC
• COMPOSITE WORKING EQUIPMENT - LOCAL
• HEATING SYSTEM - CONSTANCE FCH 9626A
• THIXOFORMING MACHINE - VT T30-80KHZ

LAB SAFETY GUIDELINES

Students shall abide to the laboratory guidelines at ALL times.

General Laboratory Procedures

1. All procedures at FTKIP laboratory are according to FTKIP Lab Quality Management System (SPKM) available at the labs. Students are also to abide by all other UTeM student regulations.
2. No person should work in the laboratory area alone.
3. Do not operate any item of equipment unless you are familiar with its operation and have been authorized to operate it. If you have any questions regarding the use of equipment ask any FTKIP staff.
4. Think through the entire job before starting. Before starting a machine, always check it for correct setup and always check to see if machine is clear by operating it manually, if possible.
5. No work may be performed using power tools unless at least two people are in the shop area and can see each other.
6. All machines must be operated with all required guards and shields in place.
7. A brush, hook, or special tool is preferred for removal of chips, shavings, etc. from the work area. Never use the hands.
8. Avoid excessive use of compressed air to blow dirt or chips from machinery to avoid scattering chips. Never use compressed air guns to clean clothing, hair, or aim at another person.
9. Machines must be shut off when cleaning, repairing, or oiling.
10. Heavy sanding and painting should only be done in well-ventilated areas, preferably on the patio.
11. Do not drink beverages before or during work in the machine shop area. Do not bring food/snacks into the laboratory.
12. Hand phones are not allowed to be use in the laboratories
13. Do not work in the shop if tired, or in a hurry.
14. Don’t rush or take chances. Obey all safety rules.



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Dress Safely

- All students are required to wear their FTKIP Lab Jackets at all times while working in the labs. In the case of not having one, students are advice to wear close fitting clothing made of hard, smooth finished fabric. Such fabric will not catch easily on sharp edge or to be wrapped around drills or other rotating tools.
- Do not wear ties, loose clothing and clothes that expose body parts. Long hair must be tied back or covered to keep it away from moving machinery. Hand protection in the form of suitable gloves should be used for handling of hot objects, glass or sharp-edged items.\
- Wear clean, properly fitted eye protection. Always wear personal protective equipment such as safety glasses, goggles, or face shields where required.
- Shoes must be worn in all FTKIP laboratories. Soft canvas shoes and open toe sandals offer no protection. Students wearing this will NOT be allowed to enter any laboratory. The minimum footwear must cover the entire foot. This will protect your feet against hot, hard chips and sharp or heavy falling objects. Safety shoes offer the best protection, but ordinary leather shoes also provide considerable protection.
- Ring, wrist watches, bracelets can get caught on equipment and cause serious injury.
- Never wear gloves while operating rotating machines. They are easily caught in moving parts, which can cause serious injury on the hand; suitable gloves should be used for handling hot objects, glass or sharp- edged items.

Housekeeping

1. Practice cleanliness and orderliness in the shop areas.
2. Floors, machines, and other surfaces must be kept free of dirt and debris.
3. Wood, plastics and metal chips, sawdust, and other debris must be routinely cleaned if collection systems are not in place and operating.
4. A brush, hook, or special tool is preferred for removal of chips, shavings, etc. from the work area. Never use bare hands.
5. Keep the floor around machines clean, dry and free from trip hazards. Do not allow chips to accumulate.
6. If floor surfaces are wet or become wet during work activities, they should be protected with a non-slip coating or covering. A wet floor signage must be put up immediately. Immediately inform the FTKIP staff.

Material Storage & Handling

1. Materials which are used are to be taken and return to storage area.
2. Material should not be put on the floor, and may not be stored where they will obstruct way out from the area. Use shelves or cabinets as appropriate to store materials.
3. Stock materials must be stored in such a manner as to prevent falling, slipping, or rolling.

Chemicals

1. Chemicals must be stored in cabinets approved for that use, as appropriate.
2. Do not store incompatible chemicals together. Chemicals reactions will cause fire.

Flammable and Combustible Liquids

1. Flammable and combustible liquids include, but are not limited to, materials such as gasoline, oils, some paints, lacquers, thinners, cleaners, and solvents.
2. To determine if a material or product is flammable or combustible, read the manufacturers label on the product.
3. Only approved containers and portable tanks may be used for the storage and handling of flammable and combustible liquids.
4. Flammable liquids must be kept in closed containers when not actually in use.
5. Keep flammable liquids away from all sources of heat. An empty container can hold enough liquid or vapors to support an explosion.
6. Clean up spills immediately; the longer the liquid vaporizes the more hazardous the area becomes.
7. All flammable and combustible liquid containers must be properly labeled.
8. Cloth, paper rags, or material that has been saturated with flammable or combustible liquids must be disposed at an approved storage location.
9. Always remove/replace clothing that has become saturated with a flammable or combustible liquid even if it is just a little. Saturated clothing can easily ignite if exposed to an ignition source, such as radiant heat, flame, sparks or slag from hot work, or an electrical arc.

Fire Prevention

1. Learn the location of the nearest fire alarm as well as the nearest fire exit.
2. Learn the location and use of fire protection equipment in the building. Fire extinguisher which use a dry chemical or carbon dioxide should be readily available at all times.
3. Place oily rags or waste in proper metal containers.
4. Always close containers of inflammable materials such as paints or oils after used. Return them to their proper storage containers.

First Aid

1. Always inform FTKIP staff immediately when you or another student are injured, no matter how slight the injury.
2. Get first aid kit as soon as possible. It is a good practice to let slight or moderate cuts bleed for a few moments before stopping the flow of blood. Severe cuts or bruises should receive the immediate attention of a doctor.
3. Burns should also be treated promptly. Severe burns should receive a doctor's attention immediately. In case of Emergency students must be taken to the nearest General Hospital.

Environment

1. Ensure that the laboratory areas have adequate lighting to perform the work safely
2. Sufficient ventilation and noise control are needed to control exposures to harmful dusts, mists, fumes, chemicals, or noise.

Near Misses, Accidents and Emergencies

1. Should any near misses, accidents, or emergencies occur, please notify the person in charge of the lab.
2. Details such as time, place and how it happened must be described properly for further action by FTKIP management.

Emergency Contact

The following contact numbers are useful in the case of emergency:

UTeM's Ambulance	06-553 4439
Melaka Hospital	06-2892344
Pejabat Keselamatan	06-229 2315
CDO Helpdesk	06-2292312
Ayer Keroh Police Station	06-2321222
Ayer Keroh Fire and Rescue Brigade	06-2319134
Emergency (police / fire / brigade / hospital)	999

QUALITY ASSURANCE SYSTEM

The university has obtained the MS ISO 9001:2000 Quality System Certificate on 4th February 2005. The latest Quality Management System is based on ISO 9001:2015. The certificate is for the scope of Provision of Education Services at Undergraduate & Postgraduate and Activities of Research Management as well as Provision of Education Support Services as an effort to deliver a high-quality education service. The ISO 9001:2015 certificate acknowledges the standards of operations in UTeM.

EXTERNAL EXAMINERS

Bachelor of Manufacturing Engineering with Honours (BMIG)
15 Sept. 2025 - 14 Sept. 2027 • **Professor Ir. Dr. Wan Sharuzi bin Wan Harun** • Faculty of Mechanical and Automotive Engineering Technology • PhD in Mechanical Engineering-Kyushu University, Japan. • MEng. (Advanced Manufacturing Technology), Universiti Teknologi Malaysia. • Bachelor in Mechanical and Manufacturing Engineering, Universiti Malaysia Sarawak.
Bachelor of Industrial Engineering with Honours (BMIF)
1 May 2025 - 30 Apr. 2027 • **Professor Ir. Dr. Nik Mohd Zuki bin Nik Mohamed** • Faculty of Manufacturing and Mechatronic Engineering Technology Universiti Malaysia Pahang Al-Sultan Abdullah • PhD in Manufacturing System Engineering, University of Bradford, UK (2012) • MSc. in Manufacturing System Engineering, UPM (2006) • B.Eng. in Mechanical Engineering, Widener University, USA (1992)

EXTERNAL EXAMINERS

Bachelor of Manufacturing Engineering Technology (Product Design) with Honours (BMID)

Dec. 2025 - Nov. 2027

- **Profesor Ir. Ts. Dr. Faiz bin Turan**
- Faculty of Manufacturing And Mechatronic Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah (Dean)
- PhD in Mechanical Engineering, UTHM (2014)
- B.Eng. (First Class Hons.) Electrical Engineering, UTM (2010)
- Associate Degree in Electronic Control Engineering, Yonago National College of Technology, Tottori, Japan (1997)

Bachelor of Manufacturing Engineering Technology (Process and Technology) with Honours - BMIP

Dec. 2025 - Nov. 2027

- **Profesor Madya Ir. Ts. Dr. Azwan Iskandar bin Azmi**
- Faculty of Mechanical Engineering & Technology (FTKM), Universiti Malaysia Perlis
- PhD (Mechanical Engineering), University Auckland, New Zealand (2013)
- M.Eng. (Advanced Manufacturing Technology), UTM (2002)
- BSc. (Mechanical Engineering) Purdue University, Indiana USA.

Bachelor of Manufacturing Engineering Technology with Honours - BMIW

Dec. 2025 - Nov. 2027

- **Profesor Madya Ts. Dr. Ahmad Yasir bin Md Said**
- Universiti Kuala Lumpur- Malaysia France Institute
- PhD in Engineering (Mechanical and Materials) UKM (2011)
- M.Eng in Manufacturing System Engineering UKM (2002)
- DUT (BEng Tech), Mechanical and Manufacturing Engineering University of Poitiers (IUT de Poitiers), France (1995)

EXTERNAL EXAMINERS

Bachelor of Technology in Welding with Honours - BMIK
Apr. 2026- Mar. 2028 • **Prof. Madya Ir. Ts. Dr. Mohd Afendi bin Rojan** • Faculty of Mechanical Engineering & Technology (FKTM), Universiti Malaysia Perlis(UniMAP) (Deputy Director (Research Mode), Centre for Graduate Studies (CGS)). • PhD in Mechanics & Energy, Graduate School of Systems and Information Engineering, University of Tsukuba, Japan (2011) • Master of Engineering (MEng) in Mechanics & Energy, Graduate School of Systems and Information Engineering, University of Tsukuba, Japan (2008). • Bachelor of Engineering (BEng) in Engineering System, Faculty of Engineering System, University of Tsukuba, Japan (2006).
Bachelor of Technology in Industrial Machining with Honours - BMIM
Mar. 2026- Feb. 2028 • **Prof. Madya Ts. Dr. Mohd Rasidi bin Ibrahim** • Fakulti Kejuruteraan Mekanikal dan Pembuatan, Universiti Tun Hussein Onn Malaysia (UTHM). • PhD (Manufacturing) University of Brunnel, UK (2010) • Bachelor of Mechanical Engineering, Leeds Metropolitan University, UK (2004) • Diploma in Mechanical Engineering, German Malaysia Institute (2000)

EXTERNAL ADVISOR (MBOT)

Bachelor of Technology in Welding with Honours (BMIK)

May 2025- Apr. 2027

- **Prof. Madya Ts. Dr. Azman bin Ismail**
- Universiti Kuala Lumpur Kampus Cawangan Malaysian Institute of Marine Engineering Technology
- Head of Section, Centre For Women Advancement and Leadership (CWAL).
- PhD in Mechanical Engineering Universiti Teknologi PETRONAS (UTP), Tronoh, Perak, Malaysia (July 2020)
- Master of Engineering (Mechanical-Marine Technology), Universiti Teknologi Malaysia (UTM), Skudai, Johor, Malaysia. (Aug 2009)
- Graduate Diploma in Industrial Education and Training, Royal Melbourne Institute of Technology (RMIT), Melbourne, Australia. (Feb 2004)
- Advanced Diploma in Construction and Repair Technology (Marine Vessels), Certificate IV in Frontline Management Victoria University of Technology (VUT), Sunshine, Australia. (Feb 2004)
- Bachelor of Engineering (Honours) in Electric, Electronic and System, Universiti Kebangsaan Malaysia (UKM), Bangi, Selangor, Malaysia. (July 2000)

Bachelor of Technology in Industrial Machining with Honours (BMIM)

May 2025- Apr. 2027

- **Prof. Madya Ts. Dr. Muhamad Nasir bin Murad**
- Fakulti Kejuruteraan dan Teknologi Mekanikal, Universiti Malaysia Perlis (UNiMAP).
- Ph.D. in Mechanical Engineering, Universiti Teknologi Malaysia (UTM) (2018)
- Master of Mechanical Engineering, Kolej Universiti Teknologi Tun Hussein Onn (KUiTHO) (2005)
- Bachelor of Engineering (Mechanical-Manufacturing), Universiti Teknologi Malaysia (UTM) (2002)
- Diploma in Mechanical Engineering, Politeknik Ungku Omar (PUO) (1996)
  Certificate in Mechanical Engineering, Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS) (1995)

INDUSTRIAL ADVISORY PANEL

Bachelor of Manufacturing Engineering with Honours (BMIG)
• **YBhg. Dato' Mohd Hafidz Safari bin Ramli Al-Hajj (1 Oct. 2026 - 30 Sept. 2028)** *Chief Executive Officer* Tresenergy Sdn. Bhd. • **Ir. Muhammad Firdaus Bin Zainal (1 Oct. 2026 - 30 Sept. 2028)** *Senior Manager* Sony EMCS (M) Sdn. Bhd. • **Ts. Zulhimi Bin Mohamed Nawi (1 Oct. 2026 - 30 Sept. 2028)** *Head of Section - Senior Program Quality Engineer* CTRM Aero Composites Sdn. Bhd. • **En. Muhammad Fakhrullah Bin Azmi (1 Oct. 2026 - 30 Sept. 2028)** *Staff Specialist, Regional Lead of Material Master Data* Infineon Technologies (M) Sdn. Bhd. • **En. Mohd Nor Hafizudin Bin Bakar (1 Oct. 2026 - 30 Sept. 2028)** *Engineering Manager* ASL Electronic (Malaysia) Sdn. Bhd. • **En. Mohd Fadzli Bin Talib (1 Oct. 2026 - 30 Sept. 2028)** *Senior Project Engineer* Nestlé Manufacturing (M) Sdn. Bhd. • **Pn. Aida Bahiyah Mohd Rodzi (1 Oct. 2026 - 30 Sept. 2028)** *Senior Manager* Besi Apac Sdn. Bhd.

INDUSTRIAL ADVISORY PANEL

Bachelor of Industrial Engineering with Honours (BMIF)

- **En. Muhammad Akbar Osman bin Md Hashim (1 Oct. 2026 - 30 Sept. 2028)**
  Senior Director – QA, NPI & Corporate Departments
  Solid Point Precision Manufacturing Sdn. Bhd.

- **Ir. Mohd Hazwan Mohamed Haniffa (1 Oct. 2026 - 30 Sept. 2028)**
  Senior Executive - Mechanical & Electrical Section, Infrastructure & Asset Department
  SIRIM Berhad.

- **Ts. Mohd Sukri Sazlan Bin Sapee (1 Oct. 2026 - 30 Sept. 2028)**
  Principal Engineer / Senior Manager Industrial Engineering
  Infineon Technologies (M)

- **Ts. Zulfadhli Bin Idrus (1 Oct. 2026 - 30 Sept. 2028)**
  Senior Manager, President Office
  HRSB Holdings Sdn. Bhd.

- **En. Mohd Kamal bin Mohd Kasim (1 Oct. 2026 - 30 Sept. 2028)**
  Method & Process Manager / Production Planner
  Roca Malaysia Sdn. Bhd.

Bachelor of Manufacturing Engineering Technology (Product Design) with Honours (BMID)
• **En. Ahmad Safwan bin Salim (Dec. 2025 - Nov. 2027)** *Research & Development Manager (*PRYM Consumer (M) Sdn. Bhd.) • **En. Mohd Izhar bin Harun (Dec. 2025 - Nov. 2027)** *Head of Engineering* (G7 Aerospace Sdn. Bhd.)
Bachelor of Manufacturing Engineering Technology with Honours (BMIW)
• **En. Mohd Zulhilmi bin Ismail (Dec. 2025 - Nov. 2027)** *Head of Purchasing and Material Planning and Logistic* EP Manufacturing Berhad (Peps-JV Melaka) • **En. Amirul Herman bin Razali (Dec. 2025 - Nov. 2027)** *Head of Engineering Department (*CTRM Aero Composite Sdn. Bhd.)
Bachelor of Manufacturing Engineering Technology (Process and Technology) with Honours (BMIP)
• **En. Mohd Rashdan bin Ahmad (Dec. 2025 - Nov. 2027)** *Head of Section Quality Development (*PHN Industry Sdn. Bhd.) • **En. Mohd Azlan bin Mustaffa (Dec. 2025 - Nov. 2027)** *Head of Group Procurement (*SIRIM Berhad)

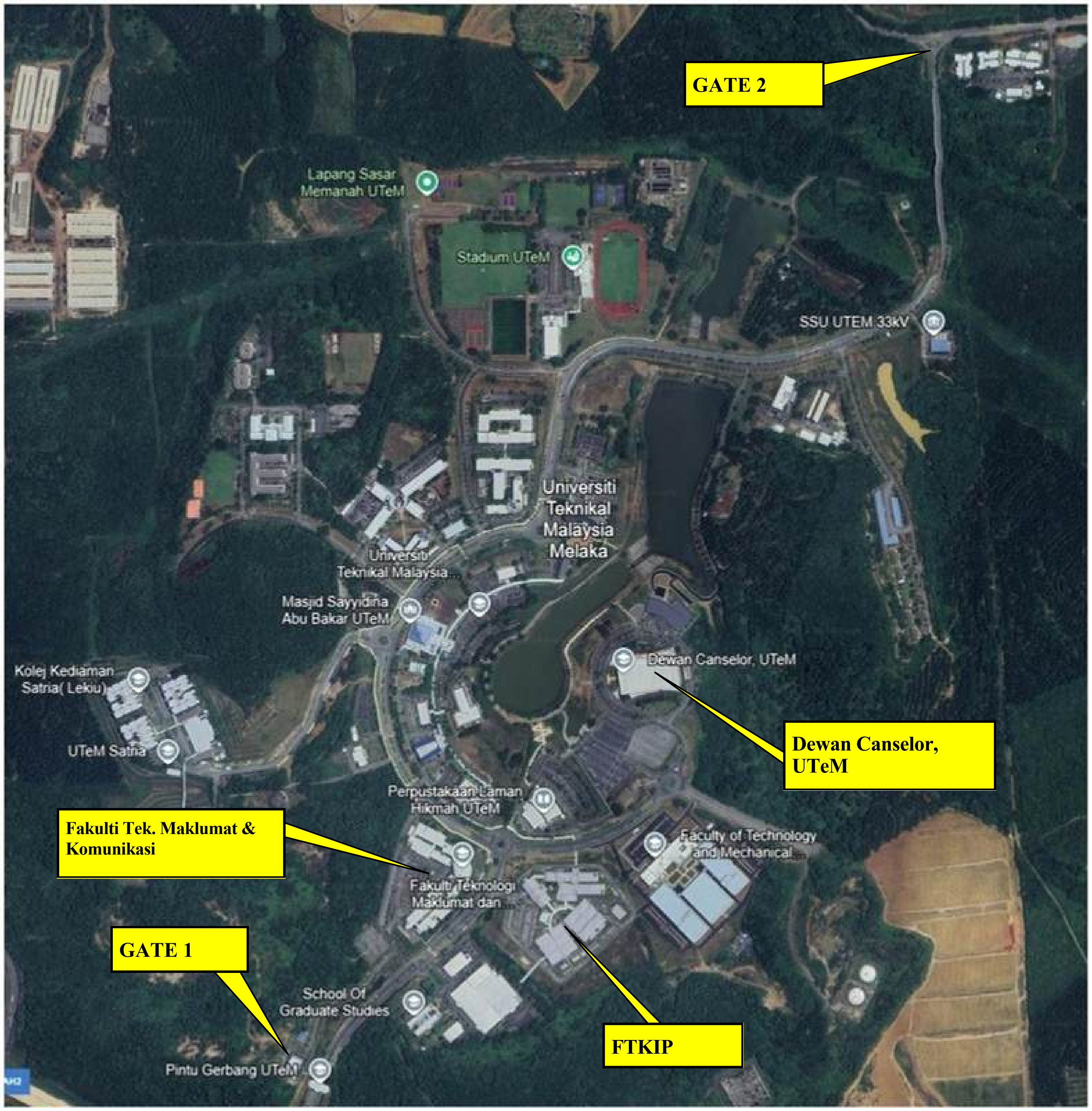
Bachelor of Technology in Industrial Machining with Honours (BMIM)

- **Ts. Ahmad Farhan bin Zakaria (Oct. 2024 - Sept. 2026)**
  Manager
  APM Plastics Sdn Bhd.
- **Ts. Roslina Aida binti Rahimi (Oct. 2024 - Sept. 2026)**
  Yield Lead
  Yield and Stability Excellence Department
  Infineon Technologies (M) Sdn. Bhd.

Bachelor of Technology in Welding with Honours (BMIK)

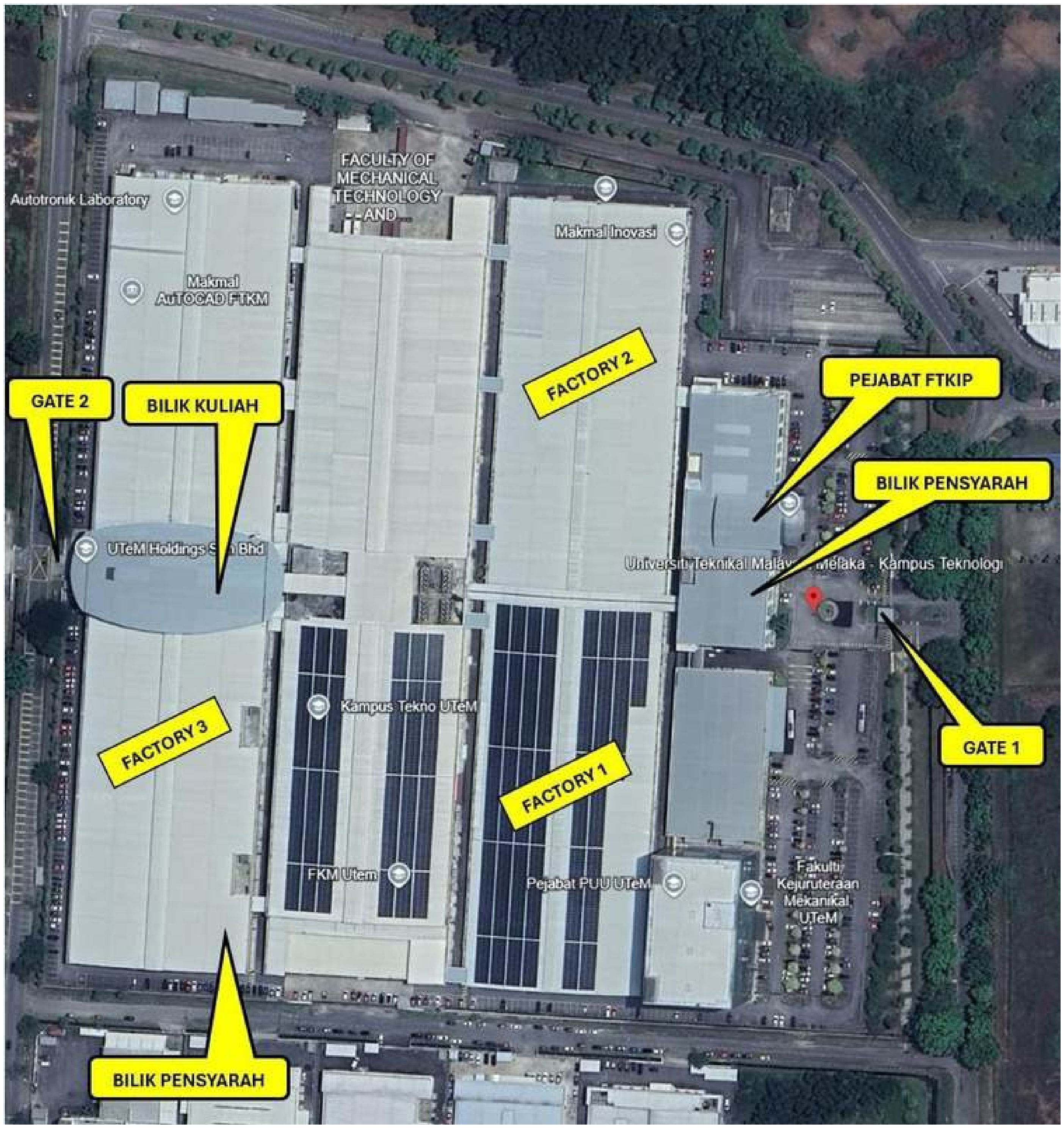
- **Ir. Ts. Mohd Faiz Bin Mohd Bokhadi (Apr. 2026 - Mar. 2028)**
  Technical Business Manager
  Group Technical Inspection (GTI) Sdn. Bhd. / IFOCS EngTech Sdn. Bhd.
- **Ir. Mohammad Rhadhi Bin Kamshah (Apr. 2026 - Mar. 2028)**
  Deputy Director
  Department of Occupational Safety and Health
- **Ts. Mohd Said bin Hamid @ Abdul Hamid (Apr. 2026 - Mar. 2028)**
  Manager Welding Section Quality Department Malaysia Marine and Heavy Engineering Sdn. Bhd.
- **Professor Ir. Dr. Hj. Mahadi Abd Murad (Apr. 2026 - Mar. 2028)**
  Managing Director and Founder
  MM Matrix Integrity (M) Sdn Bhd and Underwater Welding Engineering Centre (U.W.E.C.)
- **En. Mohd Saibuzan bin Mohd Khalid (Apr. 2026 - Mar. 2028)**
  Managing Director
  SER Solution Sdn Bhd

UTeM MAIN CAMPUS MAP



FTKIP MAIN CAMPUS MAP

FTKIP CAMPUS TECHNOLOGY MAP



FAKULTI TEKNOLOGI DAN KEJURUTERAAN INDUSTRI DAN PEMBUATAN

FACULTY OF INDUSTRIAL AND MANUFACTURING TECHNOLOGY AND ENGINEERING

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