UTeM

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FKP

FAKULTI
KEJURUTERAAN
PEMBUATAN

ACADEMIC HANDBOOK

2019/2020

FAKULTI KEJURUTERAAN PEMBUATAN

FACULTY OF MANUFACTURING ENGINEERING

ACADEMIC HANDBOOK
2019/2020

All the information in this Academic Handbook is precise and current at the time of print.
Nineteen Edition 2019

For further enquiries, kindly refer to:

Dean,
Faculty of Manufacturing Engineering
Universiti Teknikal Malaysia Melaka
Hang Tuah Jaya
76100 Durian Tunggal, Melaka
Website: www.fkp.utem.edu.my

CONTENT

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.

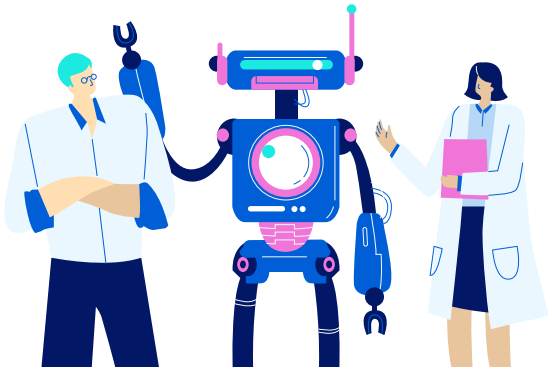
Vision

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

Mission

UTeM 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.



Objectives

To conduct **academic & professional programs** based on relevant needs of the industries.

To produce graduates with **relevant knowledge, technical competency, soft skills, social responsibility & accountability.**

To cultivate **scientific method, critical thinking, creative & innovation problem solving & autonomy** in decision making amongst graduates.

To foster development & innovation activities in **collaboration with industries** for the prosperity of the Nation.

To equip graduates with **leadership & teamwork** skills as well as develop **communication & life-long learning** skills.

To develop **techno-preneurship & managerial skills** amongst graduates.

To instil an appreciation of the **arts & cultural values** and awareness of **healthy life** styles amongst graduates.

SENIOR MANAGEMENT

PROFESSOR DATUK WIRA DR. RAHA ABDUL RAHIM

Vice Chancellor

PROFESSOR DR. ZULKIFILIE BIN IBRAHIM

Deputy Vice Chancellor, Research & Innovation

PROFESSOR DATUK Ts. DR. MOHD RAZALI BIN MUHAMAD

Deputy Vice Chancellor, Academic & International

ASSOCIATE PROFESSOR DR. NURULFAJAR BIN ABD MANAP

Deputy Vice Chancellor, Student Affairs

PROFESSOR Ts. DR. GOH ONG SING

Assistant Vice Chancellor, Industry & Community

ASSOCIATE PROFESSOR Ts. MOHD RAHIMI BIN YUSOFF

Assistant Vice Chancellor, Development & Facility Management

ENCIK MASDZARIF BIN MAHAT

Chief Operating Officer

ENCIK KHAIRUL BIN TAIB

Bursar

ENCIK MOHD ISA BIN MOHD DOM

Chief Information Officer

DATUK AZHAR BIN MOHAMED

Legal Advisor

FOREWORD BY THE DEAN

Associate Professor
Dr. Zamberi Bin Jamaludin
Dean,
Fakulti Kejuruteraan Pembuatan

بسم الله الرحمن الرحيم

Assalamualaikum Warahmatullahi Wabarakatuh

Firstly, congratulation to the new intakes of Bachelor in Manufacturing Engineering and Diploma in Manufacturing Engineering of academic session 2019/2020. Also, a very warm welcome to the Fakulti Kejuruteraan Pembuatan (FKP), the first Faculty of Manufacturing Engineering in Malaysia.

As the Dean of the faculty, I would like to extend my gratitude and appreciation to the working committee who have contributed to the establishment of this Academic Handbook – an official and essential document to both the academic staff and even more to the new members of the faculty.

This academic handbook serves as official guidelines for the following matters:

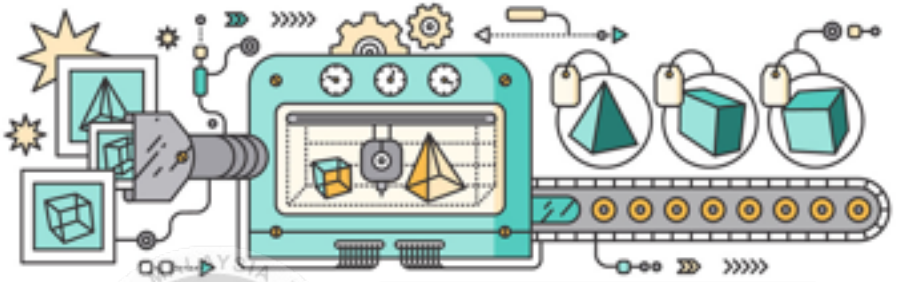
1. Organization of UTeM and FKP,
2. Teaching and Learning Philosophy of UTeM and FKP,
3. Academic Regulations,
4. Curriculum Structure,
5. Course Synopsis,
6. Staff Details, and
7. Facilities.

It is of my great desire that the contents of this document are digest in due diligent for the true benefits of all. Hopefully, with the details provided, students can plan their studies properly and effectively.

Finally, my best wishes and success to all the new intakes of 2019/2020 with hope that the experience gains in UTeM and FKP in the next three to four-years' time would serve as good starting point for the development of holistic characters that benefits the country.

Thank you.

INTRODUCTION TO MANUFACTURING ENGINEERING



Manufacturing or production is a process of transforming raw materials into a product. It includes designing and producing products through various production methods and machines. Recently, manufacturing or production engineering experiencing a new revolution via Industry 4.0 where the merging of real production with the virtual world. Here, the information technology is fully incorporated into production processes hence all conventional systems communicate with one another in an intelligent way. The "internet of things" has truly brought a revolution to the entire industrial sector. Through this intelligent system, a smart factory is introduced to facilitate customer's satisfaction. In this regards, our programs are designed to adapt to revolutions in industry since manufacturing activity is the backbone of a nation's development. It contributes between 20 - 30 percent of Gross National Product (GNP). Generally, as a nation's manufacturing activity increases, it will improve the standard of living of its populace.

Manufacturing Engineering is a branch of engineering that requires knowledge, practical skills and experience to fully grasp, exploit and control all the engineering techniques in manufacturing process and methods of producing products. It also requires aptitude to plan for manufacturing methods, research and develop tools, process and machines as well as the ability to combine facilities and systems in the intention of producing cost-effective products in a more feasible way.

The Manufacturing Engineering Program in UTeM is developed to instil a strong engineering foundation, so that graduates of this program are proficient in solving manufacturing engineering related problems. This will ensure graduates of manufacturing engineering can function effectively in their career.

Manufacturing Engineering Career

Process Engineer

Manufacturing Design Engineer

Automation Engineer

Material Engineer

Quality Control Engineer

Production Engineer

FAKULTI KEJURUTERAAN PEMBUATAN

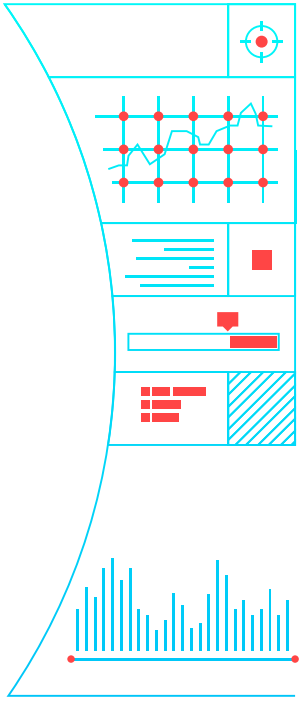
Programs Offered

Undergraduate Programs

- ☑ Bachelor of Manufacturing Engineering
- ☑ Bachelor of Industrial Engineering
- ☑ Diploma of Manufacturing Engineering

Postgraduate Programs

- ☑ Doctors of Philosophy (PhD)
- ☑ Doctor of Engineering (D. Eng.)
- ☑ Master of Science in Manufacturing Engineering (by Research)
- ☑ Master of Manufacturing Engineering (by Taught Course)
  - ✤ Manufacturing Systems Engineering
  - ✤ Industrial Engineering
  - ✤ Quality Systems Engineering
  - ✤ Advanced Automation Technology
  - ✤ Advanced Materials and Processing



Faculty's Vision

To be a Faculty of Manufacturing Engineering which is **comprehensive, excellent and recognised**.

Faculty's Mission

To carry out quality manufacturing engineering **teaching and learning, research** and **consultancy** activities that meet the current needs.

Organisation of the Faculty

Associate Professor Dr. Zamberi Jamaludin

Dean
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Associate Professor Ir. Dr. Mohd Asyadi 'Azam Mohd Abid

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Deputy Dean (Academic)
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Deputy Dean (Student Development)
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Head of Department (Diploma Program)
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Dr. Saifudin Hafiz Yahaya

Program Coordinator (Postgraduate)
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Associate Professor Ts. Dr. Mohd Shukor Salleh

Program Coordinator (Undergraduate)
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Associate Professor Ir. Dr. Mohd Hadzley Abu Bakar

Laboratory Coordinator
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Noor Asyikin Sulaiman

Senior Assistant Registrar
asyikin@utem.edu.my

Faculty's Top Management

Sitting from left to right: Associate Professor Dr. Zuhriah Ebrahim, Associate Professor Dr. Zamberi Jamaludin, Ir. Dr. Lokman Abdullah, Dr. Silah Hayati Kamsani.

Standing from left to right: Mrs. Noor Asyikin Sulaiman, Associate Professor Ir. Dr. Mohd Hadzley Abu Bakar, Associate Professor Ts. Dr. Mohd Shukor Salleh, Dr. Muhammad Zaimi Zainal Abidin, Associate Professor Dr. Noraiham Mohamad.

Accreditation

Accreditations for academic programs in Faculty of Manufacturing Engineering are conducted by Engineering Accreditation Council (EAC) and Malaysian Qualification Agency (MQA). Should the facility meet the accrediting agency's standards, the agency will recommend to the Public Services Department (PSD) to grant accreditation to the applied courses.

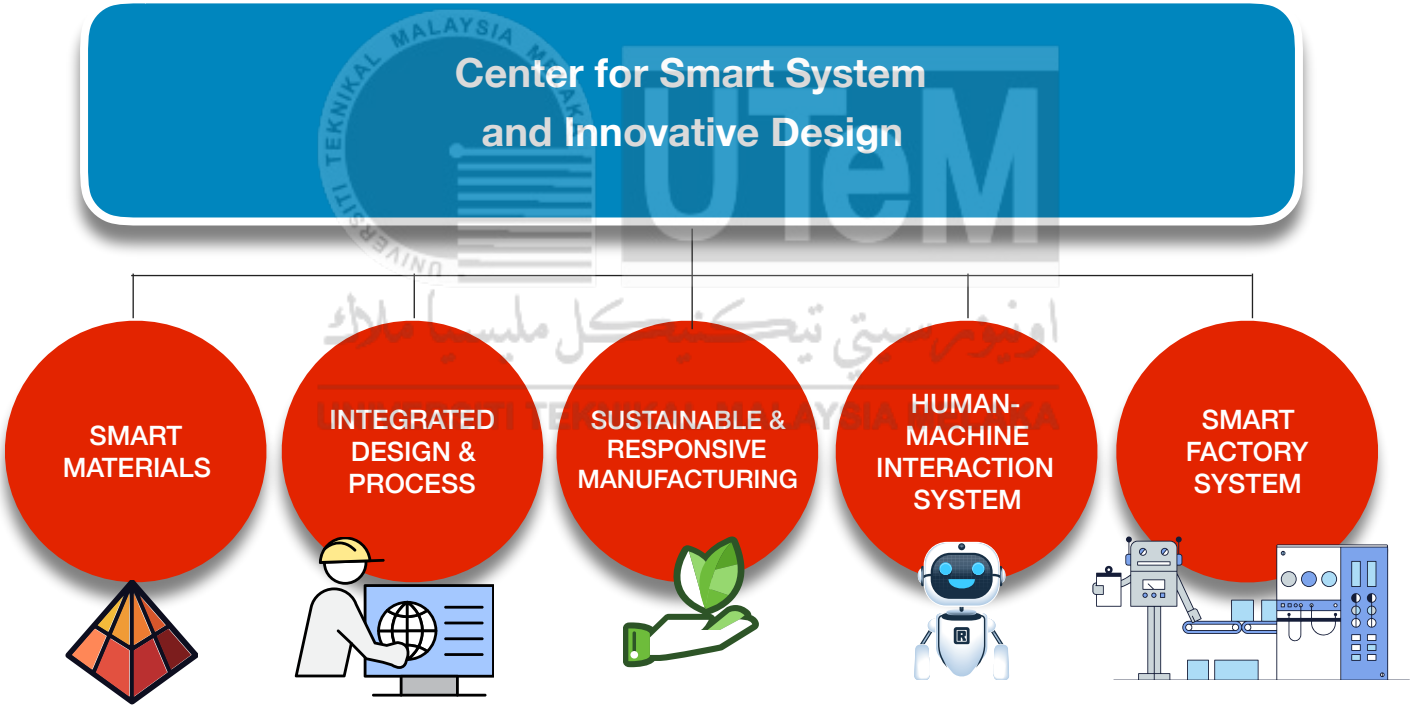
The following indicates the programs accreditation in Faculty of Manufacturing Engineering since 2005 to date.

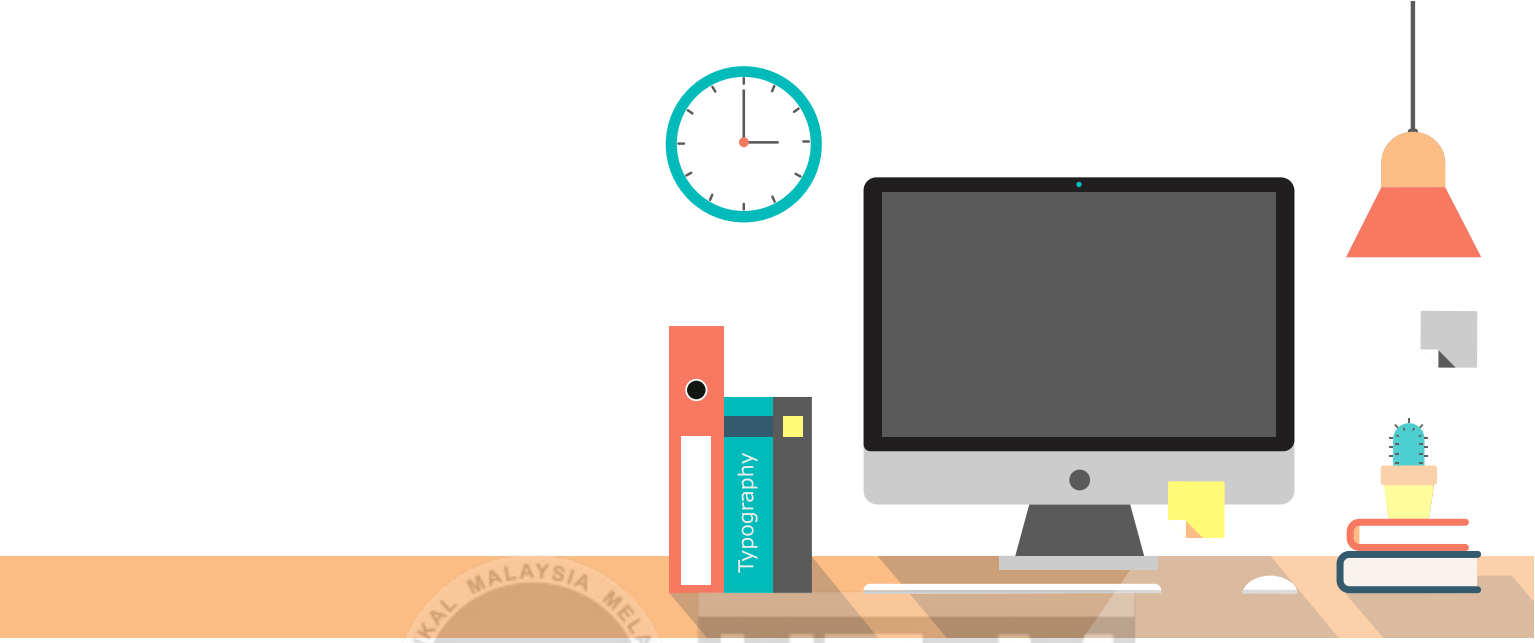
Academic Program	Accreditation Body	Accredited Since
Bachelor of Manufacturing Engineering (Manufacturing Process)	EAC	2006
Bachelor of Manufacturing Engineering (Manufacturing Design)	EAC	2007
Bachelor of Manufacturing Engineering (Robotics & Automation)	EAC	2007
Bachelor of Manufacturing Engineering (Engineering Materials)	EAC	2008
Bachelor of Manufacturing Engineering (Manufacturing Management)	EAC	2008
Bachelor of Manufacturing Engineering	EAC	2018
Diploma of Manufacturing Engineering	MQA	2011

Graduates from the accredited engineering programs which satisfy the minimum academic requirements can register as a graduate engineer with the Board of Engineers (BEM) and can apply to be a graduate member of the Institution of Engineer Malaysia (IEM).

Research Clusters

Besides teaching activities, faculty also involves in research activities. Center for Smart System and Innovative Design (CoSSID) is a platform to support the research activities which promotes industrial driven research among the FKP staff. CoSSID consists of five research groups which are Smart Materials, Integrated Design and Process, Sustainable Responsive, Smart Factory System and Human-Machine Interaction System.





ACADEMIC SYSTEM

UTeM practices a semester academic system. Every academic year comprises of two semesters and in some instances the faculty also offer special semester which is 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 weeks second part lecture before 1 week of study leave and 2 weeks for final examination.

Learning process in UTeM includes lectures, tutorials, written assignments, practical, laboratory and projects which will be done either by individual or by group work. A Bachelor Degree student has to fulfil all credit hours required to graduate within 8 - 12 semesters while a Diploma student has to do so between 6 – 10 semesters to graduate.

Entry Requirements

Bachelor Degree Program

DIPLOMA HOLDERS/ EQUIVALENT

General Requirements:

- Pass SPM / equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/Bahasa Malaysia July Examination; **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).

Program's Special Requirements:

- Pass a Diploma program in relevant field with at least a CGPA of 3.00, 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.

MATRICULATION CERTIFICATE

General Requirements:

- Pass SPM / equivalent with credit in Bahasa Melayu/ Bahasa Malaysia or credit in Bahasa Melayu/Bahasa Malaysia July Examination; **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).

Program's Special Requirements:

- Pass with at least Grade C in Mathematics, Physics, and Chemistry.

STPM HOLDERS

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 Grade C (CGPA 2.00) in two other Courses, **AND**
- A minimum of Band 2 in Malaysian University English Test (MUET).

Program's Special Requirements:

- Pass with at least Grade C (CGPA 2.00) in Mathematics, Physics, and Chemistry.

Diploma Program

SPM HOLDERS

University's General Requirements:

- ☑ Pass SPM or equivalent with a minimum of 5 credits for the Courses inclusive of Bahasa Melayu.

Program's Special Requirements:

- ☑ Fulfil the University's General Requirement with a minimum of 4 Credits for the Courses below:
  - Mathematics
  - Additional Mathematics
  - Physics
- ☑ **AND** 1 of the following Courses:
  - Additional Science
  - Science
  - Chemistry
  - Biology
  - Electronics Technology
  - Electric & Electronic Engineering Technology or Mechanical
  - TV and Radio Services
  - Electrical Installation and Control
  - Geometry and Electronics Drawing
  - Geometry and Machine Drawing/ Machinery/Metal Fabrication
  - Geometry and Automotive Drawing
  - Geometry and Building Structure Drawing/ Air-Conditioning
  - Engineering Drawing
  - Geography/Biology
  - Arts/Design
- ☑ Pass English Language

Definition of Courses Categories

University Compulsory Courses

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

Program Core Courses

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

Course Core

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

Electives Courses

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

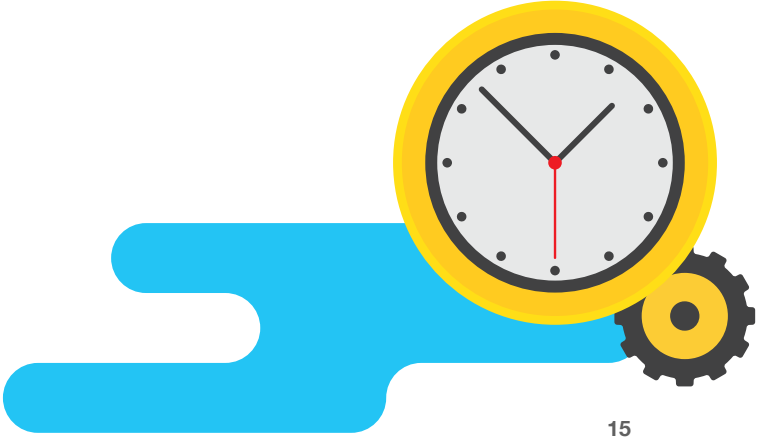
In the semester system, each subject is given credit values except for Courses, which are determined by the University. Each subject is given credit to show the importance of the contents. The amount of credit represents the effort expected to be performed by students.

As a result, students should wisely allocate their study time based on the credit of the Courses.

Credit System for Industrial Training

The duration of Industrial Training for Bachelor Degree Program is 10 weeks for a total of 5 credit hours.

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	1 hours per credit per week
☑ Tutorial	2 hours per credit per week
☑ Practical	2-3 hours per credit per week
☑ Others (Project, Problem-Based Learning, Assignment)	3 hours per credit per week, distributed accordingly.
INDEPENDENT LEARNING	
☑ Preparation for lecture	0.5 - 1 hour per lecture session
☑ Preparation for tutorial	0.5 - 1 hour per tutorial session
☑ Preparation for practical	0.5 - 1 hour per practical session
☑ Other Preparations (Project, Problem-Based Learning, Assignment)	3 hours per credit per week, distributed accordingly.
☑ Final Exam	~ 4 minutes for each assessment minute.
☑ Test	~ 4 minutes for each assessment minute.
☑ Coursework / Assignment	~ 4 minutes for each assessment minute.
☑ Others	~ 4 minutes for each assessment minute.
ASSESSMENT	**ASSESSMENT**
☑ Final Exam	~ 1 minutes per unit marks per credit
☑ Test	~ 1 minutes per unit marks per credit
☑ Assignment	~ 1 minutes per unit marks per credit
☑ Others	~ 1 minutes per unit marks per credit

Credit per semester …….. **18 credits (maximum)***
12 credits (minimum) *
21 credits (with the dean's permission)

Grading System

The following shows the grading system adopted by the university.

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

Academic Achievement

Grade Point

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

- Total Grade Point (TGP) $= k_1 m_1 + k_2 m_2 + ... + k_n m_n$
- Total Calculated Point (TCC) $= k_1 + k_2 + ... + k_n$
- Grade Point Average (GPA) $= \frac{TGP}{TCC}$

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 $= \frac{TGP_1 + TGP_2 + ... + TGP_n}{TCC_1 + TCC_2 + ... + TCC_n}$

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 (KB)	CGPA ≥ 2.00
Conditional Status / Kedudukan Bersyarat (KS)	1.70 ≤ CGPA < 2.00
Fail / Kedudukan Gagal (KG)	CGPA < 1.70

1. With the approval of the Senate, a student who obtains CGPA ≥ 2.00 but GPA < 1.00 may;
   (i) Continue his studies with KB; or
   (ii) Be instructed to defer his studies to the next semester with KB; or
   (iii) Be terminated from his studies with KG
2. With the approval of the Senate, a student who obtains 1.70 ≤ CGPA < 2.00 but GPA < 1.00 may;
   (i) Be instructed to defer his studies to the next semester with KS; or
   (ii) Be terminated from his studies with KG.
3. The Academic Standing of a student in the Special Semester shall not be determined. Grades obtained in the Special Semester shall be counted when calculating the CGPA of the subsequent semester. For a student who is due to graduate in the Special Semester, the CGPA will be calculated based on the Repeat or Redeem Subject.
4. A student who obtains KS for three (3) consecutive semesters shall be given KG.
5. A student who obtains KG shall be terminated 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: -

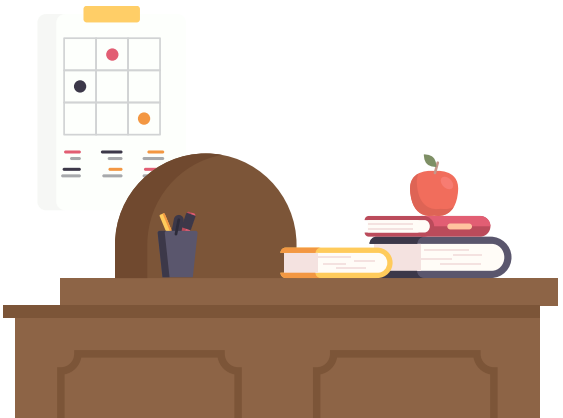
(a) The student must obtain a Good Academic Standing (KB) in his final semester;
(b) The student must pass all Courses required by the curriculum;
(c) Any other conditions set by the University.

The Good Academic Standing Award (KBA) shall be given to students who have fulfilled the conditions of Rule (1) above.

ACADEMIC ADVISORY SYSTEM

Academic Advisor Responsibility

An academic advisor is required to explain to the students the important information concerning: university's policy and procedure, curriculum and syllabus, academic calendar and etc. The academic advisor also needs to assess the students' aptitude to ensure credit hours and Courses registered are suitable with their capability. In addition, the academic advisor must approve application to drop/add Courses based on student performance.



Student's Responsibility

Students are responsible to consistently meet with their academic advisor twice per semester to get advice and help in solving any academic problems that arise. Every semester, students need to discuss their study plan with their academic advisor and to consult their academic advisor before registering their Courses for the respective semester.

In general, students are responsible to:

a) meet up with the academic advisor in the first week of the semester and obtain the general explanation about the Semester System and related issues concerning learning process as well as monitoring student's performance.

b) obtain an assistance from the academic advisor in preparing their study plan throughout their four years of study in UTeM, such as Courses to be registered every semester, credit hours, etc.

c) inform the Faculty's Administration and academic advisor concerning their performance and problems.

d) check and verify Courses registered for the examination.

e) seek advice and explanation from their academic advisor the effects of registering and dropping Courses

SOCIETY OF MANUFACTURING ENGINEERS

Society of Manufacturing Engineers (SME) is a society set up by the faculty for manufacturing engineering students. The vision of SME is to produce graduates with excellent leadership skills, highly competitive and critical thinking.

The mission of SME is to produce graduates with good personality and applying rational attitude in an organisation. Here you will find that SME is a society which organise the social events which involve the FKP students via their activities that can promote professional development and enhancing their soft skills such as communication, problem solving, entrepreneurship and leadership. Therefore, students are encouraged to be active in the SME as the activities carried out could supplement the formal engineering education obtained.

SME organises many activities either independently, or in cooperation with the faculty. Examples of the activities include: industrial visits, open day, outdoor activities, motivational courses, community services and industrial talks.

Activities at FKP

ACADEMIC MOBILITY

Every year, the faculty will choose several selected students to local and International Universities to experience certain program as a way to incorporate wider dimension to their university training. The students exchange program in which UTeM students go and study at other University is called Outbound Mobility. UTeM also welcomes students from other University to study here under the program called Inbound Mobility. There are two types of academic mobility: Mobility with Credit and Mobility without Credit. For interested applicants, please get more information from the FKP Mobility Committee and if qualified feel free to fill up the Mobility application form.

Institute	Number of students	
	2017	2018
Sepuluh Nopember Institute of Technology (ITS), Indonesia	8	6
Hoschule Hannover University of Applied Sciences & Arts, Germany	8	5
Istanbul Aydin University, Turkey	1	1
Kumoh Institute of Technology, South Korea	1	
Tokushima University, Japan		4
Kyoto University, Japan		6
Universitas Islam Batik (UNIBA), Indonesia		3

Outcome Based Education (OBE)

Washington Accord (WA) is an agreement between various countries to endorse the equivalency of engineering programs whereby Malaysia is one of its provisional signatories. All graduates of engineering programs that have been accredited in a member country are considered already fulfilling the academic requirements to enter engineering practice in all countries signing the agreement.

The WA has adopted the Outcome Based Education (OBE) as its teaching and learning approach. OBE is a process that involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of high order learning and mastery rather than accumulation of course credits.

PROGRAM DETAILS

Bachelor of Manufacturing Engineering

Bachelor of Manufacturing Engineering is first offered in September 2014 as a replacement of previous specialised programs in Manufacturing Engineering. This program is designed with the objective of fulfilling the government's aspiration to produce multi-skilled graduates in the field of Manufacturing Engineering that would uphold the growth of manufacturing industries in Malaysia. In this program, students are taught with knowledge on generic skills, mathematics and sciences, common engineering domains, manufacturing engineering and knowledge specifics to Materials Engineering, Manufacturing Design, Manufacturing Process, Robotics and Automation, 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 Engineers, Product Design Engineers, Production Engineers, Manufacturing Engineers, Sales Engineers, Machine Tool Designers and Manufacturing Engineering Consultants.

Program 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 Degree program of Faculty of Manufacturing Engineering.

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.

Program Outcomes (PO)

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

PO1	Able to apply knowledge of mathematics, science, engineering fundamentals and manufacturing engineering to the solution of complex engineering problems.
PO2	Able to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3	Able to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO4	Able to conduct investigation into complex problems using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO5	Able to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.
PO6	Able to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Able to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO8	Able to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
PO9	Able to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO10	Able to demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO11	Able to recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change and acquire knowledge on entrepreneurship.
PO12	Able to demonstrate knowledge and understanding of the principles of finance and project management

Curriculum Details & Structure 2019/2020

	Year 1		Year 2		Year 3			Year 4		
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 3	Semester 1	Semester 2	Credits
University Compulsory Courses	BKK* ***1 Co-curriculum 1	BLHW 1442 English for Academic Purpose	BLHW 2452 Academic Writing	BLHW 3462 English for Professional Interaction				BTMW 4012 Technological Entrepreneur-ship		14
		BLHW 1702 TITAS / BLHW 1742* Malaysian Studies		BLHW 2712 Ethnic Relation/ BLHW 2752* Malaysian Cultures						
		BKK* ***1 Co-curriculum II								
Program Core Courses	BMFG 1313 Engineering Mathematics 1	BMCG 1013 Differential Equation	BENG 2143 Engineering Statistics	BEKG 2443 Engineering Mathematics 2						15
Mathematics, Statistics & Computing		BITG 1233 Computer Programming								
	BMCG 1523 Engineering Graphics & CADD	BEKG 1123 Principle of Electric & Electronics	BEKG 1233 Principles of Instrumenta-tion & Measurement	BEKG 2433 Electrical Systems	BMFG 3213 Engineering Economy & Management	BMFU 3223 Integrated Design Project	BMFU 3935 ** Industrial Training (10 weeks)	BMFU 4912 Bachelor Degree Project I	BMFU 4924 Bachelor Degree Project II	38
Engineering	BMFG 1213 Engineering Materials								BMFU 4322 Engineer & Society	
	BMCG 1113 Statics								BMFU 4321 Engineering Seminar	
Course Core	BMFS 1122 Manufacturing Workshop	BMFB 1223 Strength of Materials	BMFA 2123 Dynamics	BMFP 2223 Quality Control	BMFR 3513 Product Design & Manufacturing	BMFP 3122 Manufacturing Sustainability		BMFP 4413 Manufacturing Management		52
			BMFR 2213 Thermo Fluids		BMFR 3313 Mechanics of Machine	BMFP 3423 Industrial Engineering				
			BMFS 2613 Manufacturing Process	BMFS 2623 Advanced Manufacturing Process	BMFB 3323 Material Selection	BMFR 3223 CAD/CAM/ CAE		BMFS 4613 CNC Machining		
					BMFA 3213 Industrial Automation	BMFA 3313 Control Systems				
		BMFB 1221 Engineering Lab 1		BMFA 2121 Engineering Lab 2	BMFP 3111 Engineering Lab 3					
Electives	BLHL ***2 Language Electives					BLH* ***2 General Elective		BMF* 4**3 Elective 1	BMF* 4**3 Elective 3	16
								BMF* 4**3 Elective 2	BMF* 4**3 Elective 4	
Additional Course								*** Preparation Course for Professional Certification		
Credits	17	18	17	17	16	16	5	16	13	135

* For international student only

** Course is held in special semester Year 3, Semester 3

*** Course outside curriculum, i.e. preparation course for professional certification held in Year 4, Semester 1.

Electives

ELECTIVE 1

- BMFA 4213 Mechatronics
- BMFB 4113 Advanced Materials
- BMFP 4113 Industrial Ergonomics
- BMFR 4513 Ergonomics in Design
- BMFS 4113 Non-Metallic Processes
- BITS 2513 Introduction to Data Science

ELECTIVE 2

- BMFA 4113 Industrial Robotics
- BMFB 4713 Green Materials and Biomaterials
- BMFP 4313 Modeling and Simulation
- BMFR 4613 Additive Manufacturing
- BMFS 4513 Metal Processing Technologies
- BITM 2313 Human Computer Interaction

ELECTIVE 3

- BMFA 4323 Industrial Drives System
- BMFB 4123 Materials Characterization
- BMFP 4123 Production Optimization
- BMFR 4223 Production Tools Design
- BMFS 4123 Surface Engineering in Manufacturing
- BITS 3423 Information Technology Security

ELECTIVE 4

- BMFA 4123 Intelligent System
- BMFB 4723 Nanotechnology
- BMFP 4323 Lean Six Sigma
- BMFR 4423 Concurrent Engineering
- BMFS 4523 Advanced CNC Machining
- BMFG 4123 Cloud Manufacturing

LANGUAGE ELECTIVE

- BLHL 1212 Mandarin Language 1
- BLHL 1612 Korean Language 1
- BLHL 1112 Arabic Language 1
- BLHL 1412 German Language 1
- BLHL 1312 Japanese Language 1
- BLHL 1012 Malay Language for Communication*

GENERAL ELECTIVE

- BLHC 4032 Critical & Creative Thinking
- BLHC 4012 Organisational Communication
- BLHH 1032 Industrial and Organisational Psychology
- BLHC 4022 Consultation Skill
- BLHW 1722 Philosophy of Science and Technology
- BLH* ***2 Industrial Sociology

SYLLABUS

Compulsory University Courses

- TITAS
- English for Academic Purposes
- Ethnic Relation
- Academic Writing
- English for Professional Interaction
- Malaysian Cultures
- Malaysian Studies
- Technological Entrepreneurship
- Co-Curriculum 1
- Co-Curriculum 2

TITAS (BLHW 1702)

Course Learning Outcomes

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

(1) Explain the basic concepts of civilization.
(2) Correlate the history with the advancement of world civilization.
(3) Analyze the issues and challenges of world civilization.

Synopsis

This subject explains the science of civilization that includes definitions, universe views and civilizational sources. These Courses also deal with the similarities and differences of world civilizations by looking for points of view through dialogue of civilization. In addition, these Courses also examine current issues and challenges as well as their impact on the development of modern civilization.

References

- Md Aros, A., Haji Latiff, A. Z. & Hamzah, A., 2009, *Buku revisi untuk Tamadun Islam dan Tamadun Asia*. Kuala Lumpur: Penerbit Fajar Bakti.
- Sulaiman, M.h & Sulaiman, A. @ Mohamad, 2009, *Tamadun Islam dan Tamadun Asia.* Selangor: Penerbit Universiti Sains Malaysia.
- Bakar, O., 2009, Modul Pengajian Tamadun Islam dan Tamadun Asia. Kuala Lumpur: Penerbit Universiti Malaya.

ENGLISH FOR ACADEMIC PURPOSES (BLHW 1442)

Course Learning Outcomes

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

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

Synopsis

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

Pre-Requisite

None.

References

- De Chazal, E., & Rogers, L. (2013). Oxford EAP: A course in English for Academic Purposes. Oxford: Oxford University Press.
- McDonald, A. & Hancock, M. (2010). English result. Oxford: Oxford University Press.
- Paterson, K. & Wedge, R. (2013). Oxford grammar for EAP. Oxford: Oxford University Press.

ETHNIC RELATION (BLHW 2712)

Course Learning Outcomes

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

(1) Evaluate the importance of national identity and volunteerism towards creating a responsible citizen.

(2) Develop social relations and interactions among multi ethnics.

Synopsis

These Courses discuss the basic concepts of culture, ethnic roles and their influence on the socio-political and socio-economic aspects of the country, especially in realizing the agenda of unity. These Courses also provide exposure on issues and challenges in the context of unity in Malaysia. Additionally, these Courses also covered the development of globalization and its impact on identity and development process at Malaysia level. In addition, these Courses will formulate issues of unity and their proposed improvement in Malaysia.

References

- Ahmad, A. M., 2009, *Kontrak Sosial*. Kuala Lumpur: Utusan Publication & Distribution.
- Baharuddin, S. A., 2012, *Modul Hubungan Etnik*. Selangor: Institut Kajian Etnik Universiti Kebangsaan Malaysia.
- Hashim, W., 2011, *Hubungan etnik di Malaysia*. Kuala Lumpur: Institut Terjemahan Negara Malaysia.
- Wan Husin, W. N., 2012, *Peradaban dan perkauman di Malaysia: Hubungan etnik Melayu-Cina*. Kuala Lumpur: Penerbit Universiti Malaya.

ACADEMIC WRITING (BLHW 2452)

Course Learning Outcomes

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

(1) Prepare clear and detailed descriptions of a product related to fields of interest.

(2) Express arguments systematically in a composition.

(3) Prepare short reviews of technical materials.

Synopsis

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

Pre-Requisite

BLHW1442.

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.

ENGLISH FOR PROFESSIONAL INTERACTION (BLHW 3462)

Course Learning Outcomes

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

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

Synopsis

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

Pre-Requisite

BLHW2452.

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.

MALAYSIAN CULTURES* (BLHW 2752)

Course Learning Outcomes

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

(1) Analyse the general issues related to Malaysian culture.
(2) Report the scenario of cultural diversity in Malaysia.
(3) Explain the comparison between Malaysian culture with their home countries in various aspects

Synopsis

This subject exposes international students to the socio-cultural background of Malaysia which includes ethnic composition, religions, traditions and values. Other elements like music, arts, cuisine, costume, ethnic games, celebrations and national festivals are also highlighted. Student Centered Learning (SCL) methods such as group discussion and presentation will be used in order to assist international students in developing their understanding and appreciation of Malaysian culture.

References

- Munan, H., 2010, *Cultural Shock. A Guide to Customs and Etiquette*. Kuala Lumpur: The New Straits Times Press.
- Munan, H., 2010, *Malaysian Culture Group*. Kuala Lumpur: Book Group.
- Seng, G. Y., 2011, *Media, Culture and Society in Malaysia*. Kuala Lumpur: Routledge.

*Only for international students.

MALAYSIAN STUDIES FOR INTERNATIONAL STUDENT* (BLHW 1742)

Course Learning Outcomes

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

(1) Analyse the historical and cultural heritage, political and economic scenario in Malaysia.

(2) Integrate the comparison between Malaysian achievement with their home countries in various aspects.

Synopsis

Students are exposed to a wealth of information on Malaysia. They will gain information on Malaysian's historical background, political system and socio-economic structure. Additionally, this subject highlights the Malaysian government's development plans and major policies in economic, industrial and socio-cultural aspects. It also gives emphasis on the attitude and commitment of the Malaysian government towards the regional and international issues as reflected in its foreign policy.

References

- Embong, A. R., 2010, *Malaysian studies: Looking back moving forward: Selected speeches, public statements and other writings*. Kuala Lumpur: Persatuan Sains Sosial Malaysia.
- Baginda, A. R., 2009, *Malaysia at 50 and Beyond*. Kuala Lumpur: Malaysian Strategic Research Centre.
- Buang, A., 2009, *Dasar-dasar utama kerajaan Malaysia*. Kuala Lumpur: Institusi Tadbiran Awam Malaysia.

*Only for international students.

TECHNOLOGICAL ENTREPRENEURSHIP (BTMW 4012)

Course Learning Outcomes

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

(1) Recognize the importance of entrepreneurship, the role of entrepreneurship in today's society, and the technical knowledge of the entrepreneurial process.

(2) Explain the basic concepts of interdisciplinary competences in management, and create technology-based businesses.

(3) Present a business plan project and develop an entrepreneurial profile.

Synopsis

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

References

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

SYLLABUS

Program Core Courses

- Engineering Mathematics 1
- Engineering Graphics and CADD
- Engineering Materials
- Statics
- Differential Equation
- Computer Programming
- Principle of Electric & Electronics
- Principles of Instrumentation & Measurement
- Engineering Statistics
- Engineering Mathematics 2
- Electrical Systems
- Integrated Design Project
- Engineering Economy & Management
- Industrial Training
- Bachelor Degree Project 1
- Bachelor Degree Project 2
- Engineer & Society
- Engineering Seminar

ENGINEERING MATHEMATICS 1 (BMFG 1313)

Course Learning Outcomes

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

(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 focusing 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.
- Kreyszig, E., Advanced Engineering Mathematics, 10th edition, John Wiley, 2010.
- Guo W., Advanced Mathematics for Engineering and Applied Sciences. Pearson, 2015.

ENGINEERING GRAPHICS AND CADD (BMCG 1523)

Course Learning Outcomes

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

(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 drawing that are neat, correctly dimensioned using industry standards. Students will use freehand sketches methods and CAD software to develop visualisation 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.

ENGINEERING MATERIALS (BMFG 1213)

Course Learning Outcomes

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

(1) Explain the basic concepts of engineering materials in terms of interatomic bonding and crystal structure.

(2) Analyze the properties of engineering materials based on its structure.

(3) Describe the processing methods for engineering materials.

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. Explannation 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., 2014, Materials Science and Engineering - An Introduction, 9th Edition. John Wiley & Sons Inc.
- Askeland, D.R., Fulay, P.P. and Wright, W.J., (2012), The Science and Engineering of Materials, 6th edition. Thomson.
- Smith, W.F. (2010) Principle of Materials Science & Engineering, 5th edition, Mc. Graw Hill.
- Shackelford, J.F. (2009) Introduction to Materials Science for Engineering, 7th edition, Prentice Hall.

STATICS (BMCG 1113)

Course Learning Outcomes

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

(1) Describe and apply the basic concepts and fundamental principles of engineering mechanics (statics).

(2) Analyze and solve equilibrium problems of particle.

(3) Analyze and solve equilibrium problems of rigid body.

Synopsis

The engineering mechanics of statics provides an introduction and 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., 2015, Engineering Mechanics – Statics, 13th 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.

DIFFERENTIAL EQUATION (BMCG 1013)

Course Learning Outcomes

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

(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, 6 th Ed. Pearson Education Inc., U.S.A.
- Kohler W. & Johnson L., 2011. Elementary Differential Equations with Boundary Value Problems. Pearson Education Inc., U.S.A.
- Edwards C. H. & Penny D. E., 2008. *Differential Equations and Boundary Value Problems*, 4 th Ed. Pearson Education Inc., New Jersey, U.S.A.

COMPUTER PROGRAMMING (BITG 1233)

Course Learning Outcomes

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

(1) Describe the fundamental principles of problem solving, programming techniques and structures in program development.
(2) Interrelate 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 the 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., 2011, Starting Out with C++ Brief Version: From Control Structures Through Objects 7th. Edition", Pearson Education.
- Abdullah, N. et. al, 2014, Lab Module Computer Programming BITG 1113, 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.

PRINCIPLE OF ELECTRIC AND ELECTRONICS (BEKG 1123)

Course Learning Outcomes

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

(1) Explain the basic principles of electrical and electronics such as the electrical terminologies and components, series and parallel circuit configurations, ohms law, voltage and current divider rules, and Kirchoff laws.
(2) Analyse basic electric DC circuits using nodal and mesh analysis methods.
(3) Apply diodes (two terminal semiconductor device) in rectifier, clipper and clamper circuits.
(4) Perform analysis to the circuits used in BJT, FET and Op-Amp amplifier applications.

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.

PRINCIPLES OF INSTRUMENTATION AND MEASUREMENT (BEKG 1233)

Course Learning Outcomes

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

(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.
- Calibration Book, 2006, Vaisala Oyj, Vaisala.

ENGINEERING STATISTICS (BENG 2143)

Course Learning Outcomes

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

(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.
- Jay L. D., 2015, Probability and Statistics for Engineering and the Sciences, 9th Edition, Thomson – Duxbury.
- Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, 2012. Probability & Statistics for Engineers & Scientists, 9th Edition, Pearson Prentice Hall.
- Sara S.h., Fauziah, Nortazi, Farah S., 2008, Introduction to Statistics & Probability A Study Guide, Pearson-Prentice Hall.

ENGINEERING MATHEMATICS 2 (BEKG 2443)

Course Learning Outcomes

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

(1) Describe the fundamental concepts of multivariable functions, multiple integrals and vector calculus.

(2) Solve the mathematical problems that involve function of several variable, multiple integrals and vector calculus.

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

Synopsis

This course introduces errors; solution of nonlinear equations; solution of linear systems; interpolation and curve fitting; eigenvalues and eigenvectors; numerical differentiation; numerical integration; solution of ordinary differential equations; solution of partial differential equation; introduction to SCILAB and its application in the numerical computations.

References

- Burden R. And Faires J.D., 2011, Numerical Analysis, 9th edition, USA: Brooks/Cole, Cengage Learning.
- Khoo C.F., 2011, Using SCILAB for Numerical Methods, Module in preparation.
- Chapra S.C. and Canale R.P., 2010, Numerical Methods for Engineers, 6th edition, New York: McGraw-Hill.
- Khoo C.F., SharifahSakinah, S.A, Zuraini, O. and Lok Y. Y., 2009, Numerical Methods, 3rd edition, Petaling Jaya: Pearson Prentice Hall.
- Chapra S.C., 2008, Applied Numerical Methods with Matlab for Engineers and Scientists, 2nd edition, New York: McGraw-Hill.

ELECTRICAL SYSTEMS (BEKG 2433)

Course Learning Outcomes

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

(1) Explain the concept of electrical power system components (generation, transmission, and distribution), various power generation systems and energy sources.

(2) Analyze the basic principle of electrical system (single and three phase system) including power factor correction.

(3) Analyse the characteristics of electric machine principles, including AC synchronous generator and transformer.

(4) Analyse the characteristics and performance of electrical transmission line and distribution system.

Synopsis

This is an introductory course for students on fundamental knowledge of electrical power system. The students will be taught on the physics of electrical power system, which includes the theory and analysis of electromagnetism, followed by power concepts & equations (single and three phase), power factor & power factor corrections, single and three-phase system and per-unit calculation. There will also topics on characteristics for static and rotating electric machine principles, including AC, DC, synchronous, induction motor and transformer. Furthermore, students will be introduced to the concepts on the electric power system network (generation, transmission and distribution) and various power generation system and energy sources. Students will also learn on basic characteristics and performance of electrical transmission line and distribution system.

References

- Glover, Sarma & Overbye, 2012, Power System Analysis and Design, 5th ed., Cengage Learning.
- Saadat, H., 2004, Power System Analysis, 2nd ed., Mc-Graw Hill.

Hughes, 2008, Electrical and Electronic Technology, 10th Edition, UK, Pearson Edu. Ltd.

INTEGRATED DESIGN PROJECT (BMFU 3223)

Course Learning Outcomes:

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

(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

With integrated design project focuses on integration of learning principles in multidisciplinary application for a product design project and prototype development that include marketing, concept design, material selection, process selection and sustainability, project management, and manufacturing cost. as a result students will gain appreciation for the interdisciplinary cooperation and for the complex and essential roles played by various members of the product development teams. this design project applies team-based approach. the team-based approach will improve teamwork and communication skills in accordance to the realities of industrial practice. Students are expected to be exposed to complex and essential team roles during the development of the design project. emphasize is also given on issues related to material selection using cesedupack, quality of the prototypes produced and marketability of the design projects.

References

- Ulrich, K. T. and Eppinger, Steven D., 2016, Product Design and Development, 6th edition, Mc Graw Hill.
- Chitale, A. K. and Gupta, R. C., 2014, Product Design and Manufacture, 6th edition, Prentice Hall, New Delhi, India.
- Kalpakjian, S. and Schmid, S. R., 2013, Manufacturing Engineering & Technology.

ENGINEERING ECONOMY AND MANAGEMENT (BMFG 3213)

Course Learning Outcomes

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

(1) Explain the principles and terminology of engineering economy, concepts of time value of money, and risk planning.
(2) Apply the concepts, principle and techniques in project management and 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.
(5) Evaluate the project risk in engineering project.

Synopsis

This course covers engineering economics and managing risk in an organization. Engineering economics discusses about the time value of money and interest relationships, which are useful to define certain project criteria that are utilised 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 alternatives are also discussed. Management of risk incorporates the concepts of probability and statistics in the evaluation of alternatives. This allows management to determine the probability of success or failure of the project.

References

- Blank, L and Tarquin, A., 2018, Engineering Economy, 8th Edition, McGraw Hill.
- Sullivan, W.G., Wicks, E.M., and Koelling, C.P., 2018, Engineering Economy, 17th Edition, Pearson.
- Park C.S., 2018, Contemporary Engineering Economics, 5th Edition, Pearson.

INDUSTRIAL TRAINING (BMFU 3935)

Course Learning Outcomes

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

(1) Apply skills and knowledge on engineering fundamentals.
(2) Analyse and/or solve engineering related problems in industry using methods, tools and techniques learnt at the university.
(3) Demonstrate ethique 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 equipments, 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

- Faculty of Manufacturing Engineering Student‘s Log Book, 2008, FKP.
- Faculty of Manufacturing Engineering Industrial Training Guide Book, 2007, 2nd Edition, FKP.

BACHELOR DEGREE PROJECT I (BMFU 4912)

Course Learning Outcomes

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

(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 finance and project management.
(5) Communicate effectively on complex engineering activities and write effective reports.

Synopsis

This course refers to individual project in student's area of specialization under the guidance of a supervisor. The work includes designing, evaluating, and analyzing components, assemblies, and systems. Develop products/manufacturing techniques demonstrating state-of-the-art technology. A written proposal, one or more written 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 Kejuruteraan Pembuatan, Universiti Teknikal Malaysia Melaka.

BACHELOR DEGREE PROJECT II (BMFU 4924)

Course Learning Outcomes

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

(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 acquire basic knowledge on entrepreneurship.
(5) Communicate effectively on complex engineering activities and write effective reports.

Synopsis

This course refers to individual project in the student's area of specialization under the guidance of supervisors. The work includes designing, evaluating, and analyzing components, assemblies, and systems. Develop products/manufacturing techniques demonstrating state-of-the-art technology. A written proposal, one or more written 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 Kejuruteraan Pembuatan, Universiti Teknikal Malaysia Melaka.

ENGINEER AND SOCIETY (BMFU 4322)

Course Learning Outcomes

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

(1) Relate the effect and impact of technology on society, culture and environment
(2) Demonstrate as a responsible professional, abiding to the code of professional ethics
(3) Demonstrate effectively the assignment given in a group or individual
(4) Response critically and handle social, cultural and global issues as well as environment, occupational health & safety issues

Synopsis

This course looks into the role of engineer in nation building, evaluation of engineering, role of engineers in society, laws related to public safety, health & welfare, future engineers, professionalism and codes of ethics, engineering as a profession, ethical theories, IEM and BEM code of ethics. Topics covered also include ethical problem solving techniques, analysis of issues in ethical problems, line drawing, flow charting, handling of conflicting problems, bribery and acceptance of gifts, ethics practice in Occupational Safety and Health at work, rights and responsibilities of engineers, quality from engineering perspective, career guidance and project management.

References

- Charles B. F., 2008, Engineering Ethics, 3rd Ed, Prentice Hall.
- Martin, M. W., Schinzinger, R., 2005, *Ethics in Engineering, 4th Ed*, McGraw-Hill.
- Canning, J., Workplace Safety for Occupational Health and Safety (Safety at Work Series V4), 2007.
- Safe Work in 21st Centuries (Educational and Training for the Next Decade Occupational Health and Safety Personnel) *National Academy Press*, 2006.
- Idrus, A., Shaharin A. S., Khamidi, M. F., 2010, *Engineers in Society*, Mc Graw Hill Education.

ENGINEERING SEMINAR (BMFU 4321)

Course Learning Outcomes

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

(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 option 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.

SYLLABUS

Course Core

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

MANUFACTURING WORKSHOP (BMFS 1122)

Course Learning Outcomes

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

(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 equipments for performing manufacturing works such as: Lathe and milling machine, arc welding, sheet metal forming, basic foundry, etc.

References

- Kalpakjian, S. and Schmid R., 2013, Manufacturing Engineering and Technology, 7th Edition, Prentice Hall.
- Mikell P. G. (2012) Fundamental of Modern Manufacturing, Prentice Hall Intl. Edition.
- Kibbe, R., Meyer, R.O., Needy, J.E. and White, W.T. (2009) Machine Tool Practices. 5th Edition, Prentice Hall.
- Amstead B.H. (1999) Manufacturing Processes, 4th Edition, John Wiley & Son.

STRENGTH OF MATERIALS (BMFB 1223)

Course Learning Outcomes

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

(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.

MANUFACTURING PROCESS (BMFS 2613)

Course Learning Outcomes

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

(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., 2013, Manufacturing Engineering and Technology, 5th Edition, Prentice Hall.
- Mikell P. Groover, Introduction to Manufacturing Processes, 3rd Edition, Mc Graw-Hill International Editions, 2011.
- Timing, R. and Tooley, M., 2001, Basic Manufacturing, 2nd edition, Newnes.
- Rao, P.N., 2013, Manufacturing Technology – Metal Cutting and Machine Tool, Mc Graw Hill.
- Groover, M. P. Fundamentals of Modern Manufacturing, Materials, Processes and System 3rd Edition, John Wiley & Sons, INC, 2007.

THERMO FLUIDS (BMFR 2213)

Course Learning Outcomes

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

(1) Determine the thermodynamic properties of pure substances using tables of property data.
(2) Apply the thermodynamic First Law and Second Law to evaluate the performance of thermal systems.
(3) Apply the basic concepts of fluid mechanics and heat transfer 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 explanation 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 basic 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., 2017, 5th Edition in SI Units, "Fundamentals of Thermal-Fluid Sciences", McGraw Hill, New York.
- Kaminsky, D.A., Jensen, M.K., 2011, "Introduction to Thermal and Fluid Engineering", John Wiley & Sons, Inc.
- Eastop, T.D, McConkey, A., 2004, 5th Edition, "Applied Thermodynamics for Engineering Technologist", Longman.
- Young, D.F., Young, B.R., Munson, T.H., Okiishi, 2018, "Fundamental of Fluid Mechanics", 8th Edition, John Wiley & Sons, Inc.
- Cengel, Y.A., Michael, A.B., (2018), 9th edition, Thermodynamics, an Engineering Approach, Mc Graw Hill, New York.

DYNAMICS (BMFA 2123)

Course Learning Outcomes

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

(1) Solve engineering dynamics problems using kinematics and equations of motion.
(2) Apply concepts of of energy-work done, as well as linear and angular impulse-momentum.
(3) Analyse the dynamics of particle and rigid body either by using the theory of force and acceleration, work and energy, and/or 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 ona 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, 2013, Engineering Mechanics: Dynamics, 13th Edition, Prentice Hall.
- Ferdinand P. Beer, E. Russell Johnston Jr., Phillip J. Cornwell, 2013, *Vector Mechanics for Engineers: Dynamics,* 10th Edition, New York, NY: McGraw-Hill.
- Meriam, J.L., Kraige, L.G. 2013, *Engineering Mechanics: Dynamics,* 6th Edition, New York, NJ: John Wiley & Sons.

ADVANCED MANUFACTURING PROCESS (BMFS 2623)

Course Learning Outcomes

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

(1) Describe the operating principles of the manufacturing processes.
(2) Select the most appropriate process for a given product design, application requirements and cost constraint. Identify the principles of non-traditional manufacturing system.
(3) Work cooperatively in groups to complete the assigned project.

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 utilised 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.
- Mcgeough, J.A., 1989, Advanced Methods of Machining, Chapman and Hall.

QUALITY CONTROL (BMFP 2223)

Course 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 practices.

(2) Apply the quality solving techniques such as SPC for variables and attributes, sampling techniques in manufacturing product.

(3) Analyze the manufacturing process and its capability using variable and attributes control.

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 philosophy and implementation of lean concepts and the methodology of six sigma statistics. Apart from providing sufficient theory to ensure a strong understanding of basic quality principles, the course also stressed on 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

- B. Donna, C. S. Summers (2010) Quality. 5th edition, Prentice Hall.
- C. Fryman, M.A. (2002) Quality and Process Improvement, Thomson Learning.
- D. Montgomery, D.C. (2012) Statistical Quality Control, 7th edition, John Wiley and Sons, Inc.

PRODUCT DESIGN AND MANUFACTURING (BMFR 3513)

Course Learning Outcomes

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

(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.

References

- Ulrich, K. T. and Eppinger, S. D., 2012, Product Design and Development. 5th 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., 2001, Manufacturing Engineering & Technology. 4th Edition. Prentice Hall.

MECHANICS OF MACHINE (BMFR 3313)

Course Learning Outcomes

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

(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.

CONTROL SYSTEMS (BMFA 3313)

Course Learning Outcomes

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

(1) Construct mathematical model 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., 2015, Control System Engineering, 7th Edition, John Wiley.
- Ogata, K., 2010, Modern Control Engineering, 5th Edition, Prentice Hall.
- Dorf, B., 2005, Modern Control Systems, 10th Edition, Prentice Hall.
- Rafan, N.A and Kamsani, S.H, Control Systems Theory. Penerbit Universiti UTeM, Malaysia, 2015.

MATERIAL SELECTION (BMFB 3323)

Course Learning Outcomes

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

(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 utilising materials properties charts, data and software.

References

- Ashby, M.F., 2010, Materials Selection In Mechanical Design, 4th Edition, Butterworth-Heinemann.
- Kenneth G.B., 2010, Engineering Materials: Properties and Selection, Prentice Hall.

INDUSTRIAL ENGINEERING (BMFP 3423)

Course Learning Outcomes

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

(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 a 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 for 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 works 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.
- Jacobs, F. R., Chase R., 2014, Operations and Supply Chain Management, 14th Edition. McGraw Hill.

CAD / CAM / CAE (BMFR 3223)

Course Learning Outcomes

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

(1) Explain CAD/CAM/CAE systems and applications in manufacturing industry.
(2) Apply basic principal 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 using 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 a 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
- Chang T.C., Richard A. Wysk, Wang H.P., Computer-Aided Manufacturing, 2nd Edition, Prentice Hall, 2006.

INDUSTRIAL AUTOMATION (BMFA 3213)

Course Learning Outcomes

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

(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) Analyse an automated system that consists either of fluid power equipment, robot work cell, PLC, vision system or other types of automation tools.
(4) Demonstrate practical skills to construct PLC as well as pneumatic and hydraulic circuitry using software.

Synopsis

This course focuses on concepts of auomation technologies and the integration of automated systems. Student will learn about sensors, machine vision, electrical motors, pneumatics, and hydraulic components. In addition, students shall be exposed to the design and analysis of Programmable Logic Controller (PLC) to solve complex automation problems. Topics of this course also cover the elements in automated system which include industrial robotics, material handling technologies, flexible manufacturing system, integration between automated manufacturing process and equipment, as well as some introduction to the revolution of industrial automation.

References

- Stenerson J., 2003, Industrial Automation and Process Control, Prentice Hall.
- Mikell, P.G., 2001, Automation, Production Systems, and Computer Integrated Manufacturing, 2nd Edition, Prentice Hall, New Jersey.
- Ashfal, C.R., 1992, Robots and Manufacturing Automation, John Wiley & Sons Inc., New York.
- Doughlas, M.C., 1986, Standard Handbook of Industrial Automation, 1st Edition, Chapman and Hall.

CNC MACHINING (BMFS 4613)

Course Learning Outcomes

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

(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 to 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 aplication of G and M codes, and mechanics and dynamics of machine tool.

References

- Krar S, Gill A. and Smid P., 2000, Computer Numerical Control Simplified. Industrial Press Inc.
- Mattson M., 2002, CNC Programming Principles and Applications. Delmar
- Madison J., 1996, CNC Machining Handbook. Industrial Press Inc.
- Thyer G.E, 1991, Computer Numerical Control of Machine Tools. Second edition. Newnes.
- Kip Hanson, 2018, Machining for Dummies. Wiley

MANUFACTURING SUSTAINABILITY (BMFP 3122)

Course Learning Outcomes

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

(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 enhance 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.
- Daniel Vallero, Chris Brasier, Hoboken, N. J. (2008), sustainable design: the science of sustainability and green engineering, John Wiley & Sons.
- Amaresh C., Sudarsan R., Prabir S. and Srinivas K. (2011), Design sustainable products, services and manufacturing systems. research publishing services.

MANUFACTURING MANAGEMENT (BMFP 4413)

Course Learning Outcomes

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

(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.

ENGINEERING LABORATORY 1 (BMFB 1221)

Course Learning Outcomes

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

(1) Perform laboratory experiments on engineering materials and statics.

(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

- Kalpakjian, S. and Schimd, R. (2013) Manufacturing Engineering and Technology, 5th Edition, Prentice Hall.
- Callister, W. D. Jr. (2006) Materials Science and Engineering – An Introduction, 5th Ed. Thomson Delmar Learning.
- Weman, K. (2003) Welding Processes Handbook, CRC, Woodhead Pub.
- Hibbeler R.C., (2013) Engineering Mechanics – Statics, 13th Edition, Prentice Hall
- Beer F.P and Johnston E.R., (2011) Statics and Mechanics of Materials, McGraw-Hill.

ENGINEERING LABORATORY 2 (BMFA 2121)

Course Learning Outcomes

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

(1) Apply the fundamental of fluid mechanics and thermodynamic laws.
(2) Apply the principle of kinematics and kinetics of particle and rigid body in dynamics laboratory activity.
(3) Collect, analyse, interpret and present them in technical report.
(4) Work cooperatively with group members, developing teamwork in the assigned activity.

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, analysing and critical thinking in presenting technical reports and implementing safe laboratory practice.

References

- Cengel, Y.A., Turner, R.H., Cimbala, J.M., (2012), 4th Edition in SI Units, "Fundamentals of Thermal-Fluid Sciences", McGraw Hill, New York.
- Kaminsky, D.A., Jensen, M.K., (2005), "Introduction to Thermal and Fluid Engineering", John Wiley & Sons, Inc.
- Cengel, Y.A., Michael, A.B., (2002), 4th Edition, "Thermodynamics, An Engineering Approach", McGraw Hill, New York.
- Mott. R.L (2006) Applied Fluid Mechanics 6th edition Pearson
- Russell C. Hibbeler, 2013, Engineering Mechanics: Dynamics. 13th Edition, Prentice Hall.
- Ferdinand P. Beer, E. Russell Johnston Jr., Phillip J. Cornwell, 2013, Vector Mechanics for Engineers: Dynamics. 10th Edition, New York, NY: McGraw-Hill.
- J.L. Meriam, L.G. Kraige, 2013, Engineering Mechanics: Dynamics. 6th Edition, New York, NJ: John Wiley & Sons.

ENGINEERING LABORATORY 3 (BMFP 3111)

Course Learning Outcomes

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

(1) Model, simulate and analyse manufacturing systems by using state of the art discrete event simulation software. (PO5)
(2) Perform computer-based simulations and technical report writing on human factors engineering/ ergonomics related to manufacturing industry environment. (PO5, PO 9)
(3) Work cooperatively with group members, developing teamwork in the assigned activity (PO 9)

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.

SYLLABUS

Language Electives Courses

- Arabic Language
- Mandarin Language
- Japanese Language
- Bahasa Melayu Komunikasi *

ARABIC LANGUAGE (BLHL 1112)

Course Learning Outcomes

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

(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.
- Yaakob, A. B., 2010, *Mausuah An-Nahwu Wassorp Wali'raf*. Beirut, Lubnan: Darul Ilmi Lilmalayin.
- Abdul Masih, G. M., 2009, Mu'jam Kawaid Al-Lugatul Arobiah Fi Jadawal Walauhat, Lubnan: Maktabah Lubnan.
- Yaakob, M., Mohd Salleh, A. H. & Mahpol, S., 2009, *Al-ibtikar*, (*Bil. 1*). Sepang Selangor: Penerbitan Salafi.
- Rahim, A., 2010, Pembelajaran bahasa Arab bagi golongan yang bukan Arab.

MANDARIN LANGUAGE (BLHL 1212)

Course Learning Outcomes

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

(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 the 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 the 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 (BLHL 1312)

Course Learning Outcomes

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

(1) Use grammar and classify the features of Japanese phonology correctly.
(2) Demonstrate correct pronunciation.
(3) Construct sentences and demonstrate writing skills.

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

- Minna no Nihongo shokyu 1, 2012, (Beginners 1) Sentence Pattern Workbook 3A Network.
- Minna no Nihongo shokyu 1, 2012, (Beginners 1) Translation & Grammatical Notes, 3A Network.
- The Association for Overseas Technical Scholarship (AOTS), 2009, Shin Nihongo No Kiso 1 English Translation, Asian Edition.
- Shin Nihongo No Kiso 1 English Translation Asian Edition, 2009, Association for Japanese-Language Teaching.

BAHASA MELAYU KOMUNIKASI* (BLHL 1012)

Course Learning Outcomes

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

(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

SYLLABUS

General Electives Courses

- Creative & Critical Thinking
- Organisational Communication
- Industrial & Organisational Psychology
- Consultation Skill
- Philosophy of Science & Technology

CREATIVE AND CRITICAL THINKING (BLHC 4032)

Course Learning Outcomes

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

(1) Identify the fundamental principle of creative and critical thinking skills.
(2) Analyse all gathered and observed information to make decisions.
(3) Create new concept or solution.

Synopsis

This subject is created to give an exposure on the fundamental principles of creative and critical thinking. The students will apply the creative and critical thinking method in problem solving through students' centered learning approach including problem based learning approach. Students will be guided in the final project, in which the future market demand analysis will be conducted the solution proposals are based on the market needs product from various perspective and out of the box.

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., 2009, Mind maps for business: revolutionise your business thinking and practice, New York: Pearson BBC Active.
- Claxton, G., Lucas, B., 2007, the Creative Thinking Plan, London: BBC Books.
- Fisher, A., 2011, Critical Thinking: An Introduction. London: Cambridge University Press.

ORGANISATIONAL COMMUNICATION (BLHC 4012)

Course Learning Outcome

At the end of this course, students should 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 organization environment.

Synopsis

This course will expose students to the fundamental ideas of organizations in public and organizational communications. In addition, students will be able to find out theories related to organizational communication and understand key elements of the organization such as leadership, official communication and informal communication. Additionally, students will be aware of obstacles, problem solving and decision-making skills in organizational communication. Finally, students will have an understanding of organizational climate, technology relations and organizational and corporate communications within the organization.

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 & ORGANISATIONAL PSYCHOLOGY (BLHH 1032)

Course Learning Outcome

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

(1) Relate the surrounding process and theory at the workplace of organisation and industrial world.
(2) Show leadership in a group task activity.
(3) Response to role and responsibility as a future employee in an organisation.

Synopsis

This course provides exposure to the psychological aspect in the industrial employment world and issues regarding behavior in an organization. There are several discussed topics including current issues in psychology, personnel planning, stress at workplace, and engineering psychology.

References

- Azlina Abu Bakar (2013). Psikologi Industri dan Pengurusan Sumber Manusia. Terengganu: Penerbit Universiti Malaysia Terengganu.
- Schultz & Schultz, Duane (2010). Psychology and Work Today. New York: Prentice Hall.
- Yukl, G. (2010). Leadership in Organizations

CONSULTATION SKILLS (BLHC 4022)

Course Learning Outcome

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

(1) Identify fundamental concepts in consultation process by using effective communication practice.
(2) Produce conclusion on best consultation techniques based on various theory approaches.
(3) Solve consultation issues based on effective consultation skill techniques in various situations.

Synopsis

This course discussed the basic consultation concept, creative and critical thinking technique, effective communication technique, and effective listening and questioning technique. The students are exposed to the required knowledge and skill to manage a consultation process effectively. Besides, the required creative and critical thinking skill, together with effective communication skill to conduct a consultation process are discussed.

References

- Lemiwki, R., Barry, B. & Saunders, D. (2016). Essentials of negotiation. USA: McGraw Hill Education.
- Fisher, R & Ury. (2011). Getting to YES: Negotiating agreement without giving in. Third Edition. Penguin Books.
- Covey, S. (2013) The 3rd Alternative: Solving Life's Most Difficult Problems. New York: Free Press.

PHILOSOPHY OF SCIENCE & TECHNOLOGY (BLHW 1722)

Course Learning Outcome

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

(1) Elaborate creatively and critically on the concept of knowledge, philosophy of science and technology from the Islamic perspective.

(2) Show the relation between the concept of philosophy of science and technology from the Islamic and west perspective.

(3) Apply the understanding of the concept of philosophy of science and technology in the current community life.

Synopsis

This course discussed the concept of philosophy of science and technology that consist of the element of creativity and innovation according to the scholars of Islam and the west. Besides, this course emphasize on the methodology in the science of Islam, the concept and the achievement of Islamic civilization in mathematic, astronomy, physic, chemistry, medical, the concept of world creation and cosmology in Islam, the achievement in current telecommunication and current issues. The approaches applied by the previous Muslim scholars become an example for the present generation to be creative and critical thinking in various fields such as invention and engineering.

References

- Abdul Rahman Abdullah (2010). Wacana Falsafah Sains Sejarah dan Pemikiran. Pulau Pinang: Pusat Kajian Pengurusan Pembangunan Islam Universiti Sains Malaysia.
- Azizan Baharuddin & Maisarah Hasbullah (2010).Pendidikan Sejarah dan Falsafah Sains di Institusi Pengajian Tinggi Awam. Kuala Lumpur: Dewan Bahasa dan Pustaka.
- Azizan Baharuddin (2009). Pemantapan Pengajian Sejarah, Falsafah dan Dasar Sains. Kuala Lumpur: Dewan Bahasa dan Pustaka.

SYLLABUS

Electives Courses

- Mechatronics
- Advanced Materials
- Industrial Ergonomics
- Production Tools Design
- Industrial Drives System
- Non-Metallic Processes
- Materials Characterization
- Production Optimization
- Ergonomics in Design
- Surface Engineering in Manufacturing
- Industrial Robotics
- Introduction to Data Science
- Green Materials and Biomaterials
- Modeling & Simulation
- Metal Processing Technologies
- Intelligent System
- Nanotechnology
- Lean Six Sigma
- Concurrent Engineering
- Advanced CNC Machining
- Human Computer Interaction
- Additive Manufacturing
- Information Technology Security
- Cloud Manufacturing

MECHATRONICS (BMFA 4213)

Course Learning Outcomes

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

(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 microcontroller 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.

ADVANCED MATERIALS (BMFB 4113)

Course Learning Outcomes

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

(1) Describe the principles and operation of the nontraditional manufacturing processes.
(2) Select the most appropriate process for a given product design, application requirements and cost constraint.
(3) Identify the principles of nontraditional manufacturing system.
(4) Work cooperatively in groups to complete the assigned project.

Synopsis

This course provides students with the understanding of the basic principles of advanced materials. Topics covered are smart materials including piezoelectric materials, shape memory alloys, shape memory polymers, electroactive polymers; lightweight materials; smart drug delivery; superconductors and advanced coatings.

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.

INDUSTRIAL ERGONOMICS (BMFA 4113)

Course Learning Outcomes

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

(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. 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

- 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.

PRODUCTION TOOL DESIGN (BMFR 4223)

Course Learning Outcomes

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

(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.
- Paquin J.R., 2006, Die Design Fundamentals, Industrial Press Inc., New York.

INDUSTRIAL DRIVES SYSTEM (BMFA 4323)

Course Learning Outcomes

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

(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.
- Lynwander, P., 1983, Gear Drive Systems, Dekker Mechanical Engineering.

NON-METALLIC PROCESSES (BMFS 4113)

Course Learning Outcomes

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

(1) Identify the non-metallic materials in term 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 concept 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.
- Groover, M.D., (2002), Fundamental of Modern Manufacturing, 2nd edition.

MATERIALS CHARACTERIZATION (BMFB 4123)

Course Learning Outcomes

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

(1) Summarize the fundamental 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 focusses on material characterization techniques, including theoretical aspect, working principle and application. Analytical techniques include microstructural analyses (Optical Microscope, Scanning Electron Microscopy, Transmission Electron Microscopy, Scanning Probe Microscopy), phase analyses (X-Ray Diffractometer Analysis and X-Ray Fluorescence), thermal analyses (Thermal gravimetry, Differential Thermal Analysis and Differential Scanning Calorimetry) and spectroscopy analysis (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 (BMFP 4123)

Course Learning Outcomes

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

(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, fundamentals 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.

ERGONOMICS IN DESIGN (BMFR 4513)

Course Learning Outcomes

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

(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 on 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 And The Design Of Work: Anthropometry, Ergonomics And The Design Of Work. CRC Press.
- SEMI S8-0712 - Safety Guidelines for Ergonomics Engineering of Semiconductor Manufacturing Equipment- SEMI International standards
- Wickens, C. D., Gordon, S. E., Liu, Y., & Lee, J. (2014). An introduction to human factors engineering.

SURFACE ENGINEERING IN MANUFACTURING (BMFS 4123)

Course Learning Outcomes

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

(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 technique prior to coating, the techniques to synthesis the coating, the various coating materials and the function of coating in various applications.

References

- Kalpakjian S. and 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.

INDUSTRIAL ROBOTICS (BMFA 4113)

Course Learning Outcomes

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

(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.
- Ross, L., Fardo, S., Masterson, J., Tower, R., 2010 Robotics: Theory and Industrial Applications, Goodheart-Willcox.

INTRODUCTION TO DATA SCIENCE (BITS 2513)

Course Learning Outcomes

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

(1) Analyse a data science problem.
(2) Define the computing requirements appropriate to a data science problem.
(3) Demonstrate 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 5 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 applied 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.
- Thomas, E., Wajid, K., Paul, B. (2016). Big Data Fundamentals: Concepts, Drivers & Techniques, 1st Edition, Prentice Hall.
- Nolan, D., Lang, D. T. (2015). Data Science in R: A Case Studies Approach to Computational Reasoning and Problem Solving, CRC Press.
- David Donoho. (2015). 50 Years of Data Science. http://courses.csail.mit.edu/18.337/2015/docs/50YearsDataScience.pdf, Accessed: 12 February 2016.
- Robert Kabacoff. (2015). R in Action: Data Analysis and Graphics with R. 2nd Edition. Manning Publications

GREEN MATERIALS AND BIOMATERIALS (BMFB 4713)

Course Learning Outcomes

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

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

Synopsis

The course focuses into the green materials and biomaterial. The first half of the course focusing 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., 2011, 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.

MODELING AND SIMULATION (BMFP 4313)

Course Learning Outcomes

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

(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.

METAL PROCESSING TECHNOLOGIES (BMFS 4513)

Course Learning Outcomes

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

(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.
- Kalpakjian, S., Schmid, S. R., 2001, Manufacturing Engineering and Technology 4th Edition, Prentice Hall.
- Groover, M. P., 2007, Fundamentals of Modern Manufacturing, Materials, Processes and System 3rd Edition, John Wiley & Sons, INC.

INTELLIGENT SYSTEM (BMFA 4123)

Course Learning Outcomes

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

(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, 2th 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, 1st Edition, Wiley-Interscience.

NANOTECHNOLOGY (BMFB 4723)

Course Learning Outcomes

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

(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 covers introduction to nanotechnology, type and properties of nanomaterials as well as its synthesis and characterization techniques. it emphasizes the processing methods involve 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 application 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, NJ: World Scientific.
- Ajayan, P.M., Schadler, L.S. & Braun, P.V., 2003, Nanocomposites Science and Technology, WILEY-VCH Verlag.
- Hornyak, G.L., Moore, J.J., Tibbals, H.F. & Dutta, J., 2009, Fundamentals of Nanotechnology, Taylor & Francis Group.
- Mahmood, A., 2011, Nanocoatings: Size Effects in Nanostrutured Films, Springer-Verlag Berlin Heidelberg.

LEAN SIX SIGMA (BMFP 4323)

Course Learning Outcomes

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

(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 wastes using Six Sigma approach.
(4) Construct improvement strategy through the combination of Lean and Six Sigma concept.

Synopsis

Lean Management course provides a fundamental thinking of the principle of eliminating production wastes. Understanding the Lean Thinking is essential in order success in implementing the lean principles. In the meantime, Six Sigma approach emphasizes the important 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

- Wilson, L., 2010, How to Implement Lean Manufacturing, 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
- George, L.M., 2002, Lean Six Sigma: Combining Six Sigma Quality with Lean Production Speed, McGraw Hill.

CONCURRENT ENGINEERING (BMFR 4423)

Course Learning Outcomes

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

(1) Apply various design tools to analyze product.
(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 of Concurrent Engineering (CE). This includes the use of associated CE tools and methods in order to develop a customer-oriented approach to New Product Introduction and Development (NPI/D). Manufacturing competitiveness, process reengineering, cooperative workgroups, information modeling, and product, process and organization integration are also included in this subject. Students will develop skills in team dynamics and management of concurrent engineering projects. This subject covers customer orientation, decision support systems, failure mode effect critical analysis, design for manufacturing and assembly, rapid prototyping methodologies and etc. Students are required to produce and analyze product based on concurrent engineering concept and hear working engineers' commentaries on concurrent engineering as it is practiced in the industry.

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.
- Hartley J.R., 1992, Concurrent Engineering: Shortening lead times, Raising Quality and Lowering costs, Productivity Press

ADVANCED CNC MACHINING (BMFS 4523)

Course Learning Outcomes

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

(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 process.
(4) Use CAM software in producing complex product.

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).
- Krar,S. A. and Scmid, P., 2001, Computer Numerical Control Simplified, Industrial Press Inc, New York.
- Mattson, M., 2002, CNC Programming: Principles and Applications, Delmar Thomson Learning.

HUMAN COMPUTER INTERACTION (BITM 2313)

Course Learning Outcomes

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

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

Synopsis

This subject 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

- Jennifer Preece, Yvonne Rogers and Helen Sharp, Interaction Design: beyond human-computer interaction, (4th Edition), John Wiley & Sons, 2015.
- Alan Dix et al., Human-Computer Interaction (3rd Edition), Prentice Hall, 2005.
- Dov Te'eni, Jane Carey and Ping Zhang, Human Computer Interaction: Developing Effective Organizational Information Systems, John Wiley & Sons, 2007.
- Jennifer Preece et al., Human-Computer Interaction, Addison Wesley, 1994
- Pepin Van Roojen et al, Sign and Symbols, The Pepin Press 2006.
- Tom Frase et al, The Complete Guide To Colour, ILEX Press Limited, 2004.
- Geri Hay et all, Activity-Centered Design: An Ecological Approach to Designing Smart Tools and Usability Systems, The MIT Press, 2004

ADDITIVE MANUFACTURING (BMFR 4613)

Course Learning Outcomes

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

(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. How can professionals and organizations realize the potential of AM and use it to create value across the entire product life cycle. 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.
- Amit Bandyopadhyay, Susmita Bose (2015), Additive Manufacturing CRC Press, Taylor and Francis Group.
- Neil Hopkinson, Richard Hague, Philip Dickens (2006), Rapid Manufacturing an Industrial Revolution for the Digital Age, Chicester: John Wiley & Sons.

INFORMATION TECHNOLOGY SECURITY (BITS 3423)

Course Learning Outcomes

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

(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 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

- Michael Goodrich, and Roberto Tamassia (2013), Introduction to Computer Security, Pearson New International Edition, ISBN 9781292025407.
- W. Stallings (2014). Network Security Essentials: Applications and Standards, 5th edition, Pearson Education Limited, ISBN 9780273793809.
- C.P. Pfleeger, S. L. Pfleeger (2011). Analyzing Computer Security: A Threat / Vulnerability / Countermeasure Approach 1st Ed., Prentice Hall International, Inc., ISBN 978-0132789462.
- D. Gollmann (2011). 3rd Edition, Computer Security, John Wiley & Sons, Inc, ISBN 9780470741153.
- J.M. Stewart, M.Chapple and D.Gibson (2015). Certified Information Systems Security Professional Study Guide, 7th edition, Sybex, ISBN 9781119042754.
- Mark Ciampa (2014), Security+ Guide to Network Security Fundamentals, 5th edition, Cengage Learning, ISBN 9781305093911
- William Stallings (2014), Cryptography and Network Security: Principles and Practice, 6th Edition, Pearson International Edition, ISBN 9780273793762
- EC-Council (2010), Disaster Recovery, 1st Edition, ISBN 9781435488700.

CLOUD MANUFACTURING (BMFG 4123)

Course Learning Outcomes

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

(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 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 a 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 a 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

PROGRAM DETAILS

Diploma of Manufacturing Engineering

The Diploma Program was first introduced in 2001.The course stresses on knowledge and skills in processing activities, manufacturing methods and machine usage in producing cost-effective products that fulfill customer's requirements. Graduates of this program can build their career as Manufacturing Technical Assistant, Technical Specialist or Entrepreneur. Graduates can also further their study in Bachelor Degree Program.

Program Educational Objectives (PEO)

Program Educational Objectives (PEO) is the first pillar of Outcome Based Education (OBE). PEO describe the expected accomplishments of the graduates in respect of their career and professional life three to five years after their graduation. PEO is specific goals describing expected achievements of graduates in their career and professional life after graduation. Below are the current PEO of Diploma programme for Faculty of Manufacturing Engineering.

PEO 1	Alumni are able to apply engineering knowledge and technical skills required to assist in analyzing and solving problems in manufacturing engineering field.
PEO 2	Alumni possess effective skills in communication, teamwork, leadership and supervision with ethical standard.
PEO 3	Alumni are creative and innovative in fulfilling the needs of industry and society for their life-long learning.

Program Outcomes (PO)

Program 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 program of studies.

PO1 Apply knowledge of mathematics, applied science, engineering fundamentals and manufacturing engineering.

PO2 Identify and analyse well-defined manufacturing engineering problems

PO3 Design solutions for well-defined technical problems and assist the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO4 Conduct investigations of well-defined problems by applying relevant codes and standard tests.

PO5 Apply appropriate techniques, resources, and modern engineering and IT tools to a well-defined engineering problems, with an awareness of the limitations.

PO6 Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to manufacturing engineering practice and solutions to well-defined engineering problems.

PO7 Evaluate the sustainability and impact of manufacturing engineering work in the solution of well-defined engineering problems in societal and environmental context.

PO8 Practice professional ethics and responsibilities, and norms of manufacturing engineering practice

PO9 Function effectively as an individual, and as a member in diverse technical teams.

PO10 Communicate effectively on well-defined engineering activities with the engineering community and with society at large.

PO11 Demonstrate and apply knowledge of engineering management principles individually, as a member or leader in a technical team and to manage projects in multidisciplinary environments.

PO12 Ability to pursue life-long learning in the context of specialised technical knowledge.

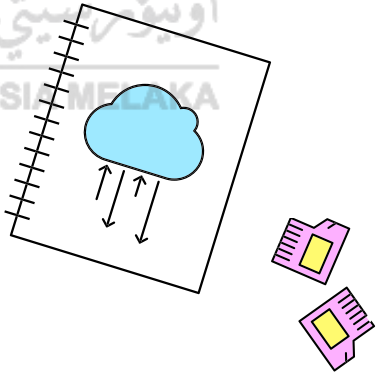
Curriculum Details & Structure 2019/2020

	Year 1				Year 2		Year 3	
	Special Semester	Semester 1	Semester 2	Semester 3	Semester 1	Semester 2	Semester 1	Credits
University Compulsory Courses	DLHW 1032 Malaysian Studies	DKMM ***1 Co-Curriculum I	DKMM ***1 Co-Curriculum II		DLHW 3432 English for Employability			14
	DLHW 1742 Leadership	DTKW 1012 Basic Cultural Entrepreneushi p	DLHW 2422 English for Effective Communication					
	DLHW 1012 Foundation English							
Program Core Courses		DMFM 1283 Engineering Physics			DMFM 2273 Engineering Statistic			77
Mathematics, Applied Science & Computing		DMFM 1213 Engineering Mathematics						
		DITG 1113 Computer Programming						
		DENE 1113 Electric & Electronic Principle						
Engineering Technician Course		DMFD 1323 Manufacturing Process	DMFM 1253 Engineering Material	DMFM 2122 CAD/CAM	DMFD 2822 Diploma Project 1	DMFD 2342 Quality Control	DMFU 3368 Industrial Training	
			DMFD 1133 Engineering Graphic and CADD	DMFD 1833 Applied Dynamics	DMFD 2853 Mechanics of Materials	DMFD 2512 Total Productive Maintenance		
			DMFD 1823 Statics	DMFD 1231 Engineering Seminar	DMFD 2413 Fluid Power	DMFD 2832 Diploma Project 2		
			DMFD 1843 Thermo-fluids		DMFD 2433 Instrumentation & Control	DMFD 2563 Industrial Automation		
			DMFD 1313 Manufacturing Practise		DMFD 2422 Jigs and Fixtures	DMFD 2333 CNC Technology		
						DMFD 2382 Occupational Safety and Health		
						DMFD 2513 Manufacturing Management		
Credits	6	18	18	6	18	17	8	91

SYLLABUS

Program Core Courses

- Engineering Physic
- Engineering Mathematics
- Computer Programming
- Principles of Electrical and Electronics
- Manufacturing Processes
- Statics
- Engineering Graphics & CAD
- Applied Dynamics
- Thermofluids
- Engineering Materials
- Manufacturing Practise
- CAD / CAM
- Engineering Seminar
- Quality Control
- Fluid Power
- Instrumentation & Control
- Total Productive Maintenance
- Diploma Project 1
- Diploma Project 2
- Mechanics of Materials
- CNC Technology
- Occupational Safety & Health
- Jigs and Fixtures
- Manufacturing Management
- Industrial Automation
- Industrial Training



ENGINEERING PHYSIC (DMFM 1283)

Course Learning Outcomes

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

(1) Define the basic laws and comprehend the basic concepts in physics.
(2) Apply the laws and the concepts systematically in problem solving.
(3) Relate between the various topics covered and their application in the field of engineering
(4) Make accurate measurement and present result in a proper scientific report.

Synopsis

The topics covers in this subject are: Forces, Acceleration and Newton's Second Law of Motion, Motion with a Changing Velocity, Circular Motion, Conservation of Energy, Linear Momentum, Fluids, Heat, Temperature, Electric Forces and Fields, Capacitor, Electric Current and Circuits, Reflection and Refraction of Light

References

- Giambatista A., Richardson B.M and Richardson R.C., College Physics, 5th edition. Mc-Graw Hill, 2019.
- Walker J.S., Physics, 5th edition, Addison Wesley, 2016.
- Cutnell J.D. and Johnson K.W., Physics, 11th edition, Wiley, 2018.
- Bueche F.J. and Hecht E., Schaum's Outline of College Physics, 12th edition, Mc-Graw Hill, 2017.

ENGINEERING MATHEMATICS (DMFM 1213)

Course Learning Outcomes

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

(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) Explain and use the fundamental theorems in function and graph, trigonometry polynomial and its partial fraction transformation.

Synopsis

This course is a blend of analytical and numerical approaches that mainly focusing 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 athematics, 2nd Edition, Prentice Hall, 2009.
- Kreyszig, E., Advanced Engineering Mathematics, 10th edition, John Wiley, 2011.
- Guo W., Advanced Mathematics for Engineering and Applied Sciences. Pearson, 2015.

COMPUTER PROGRAMMING (DITG 1113)

Course Learning Outcomes

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

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

(2) Give solutions to given problem based on the principles of problem solving, programming technique and programming structures.

(3) Construct program codes by applying suitable programming structure and techniques.

Synopsis

This course covers the introductory topics in programming using computer 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., (2016), "Starting Out with C++ Brief Version: From Control Structures Through Objects 8th. Edition", Pearson Education.
- Savitch, Walter (2015), " Problem Solving with C++", 9th Edition, Pearson Education.
- Friedman, Koffman (2011), "Problem Solving, Abstraction, and Design Using C++", 6th Edition, Pearson.
- 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.

PRINCIPLES OF ELECTRICAL AND ELECTRONIC (DENE 1113)

Course Learning Outcomes

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

(1) Describe the fundamentals of electrical and principles, construction of capacitor and magnetism.

(2) Explain the function and operation of DC and AC circuits, the concept of semiconductors theory and devices.

(3) Demonstrate experiments in group and report the findings in writing.

Synopsis

This course will discuss about electric and electronic principles; passive elements, DC and AC circuit analysis, transformer, semiconductor theory and devices: diode, Bipolar Junction Transistor, op-amp, timer and Integrated Circuits.

References

- Thomas L. Floyd, *Principles of Electric Circuits*, Prentice Hall, 7th Edition, 2003.
- Thomas L. Floyd, *Electronic Devices*, Prentice Hall, 6th Edition, 2002.
- Edward Hughes , Electric and Electronic Technology, Prentice Hall, 2002.
- A. H. Robbins and W.C. Miller, *Circuits Analysis: Theory and Practice*, 3rd Edition, Thomson Delmar Learning, 2004.
- J. R. Codgell, Foundation of Electrical Engineering, 2nd Edition, Prentice Hall, 1999.
- John Hiley, Keith brown and Ian McKenzie Smith, Hughes Electrical and electronic technology, tenth edition, Prentice Hall, 2008.

MANUFACTURING PROCESSES (DMFM 1323)

Course Learning Outcomes

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

(1) Describe the basic principles and operation of common processes in manufacturing.
(2) Explain the appropriate machine tool and its ability in producing required part.
(3) Apply the principles of machining and manufacturing process in developing a part using learnt processes..
(4) Produce a project with engineering values based on the skills acquired.

Synopsis

This course is an introduction to the manufacturing processes and machineries involved. Manufacturing engineers should have strong knowledge and fundamentals about various manufacturing processes. In this course the students will be exposed to the general introduction of manufacturing activities. The students will be provided with clear understanding of four broad manufacturing topics; forming, removing, joining and finishing. The sub elements of these topics will enable the student to have strong shield of manufacturing processes. Besides that, the students will also be taught the fundamentals of non-metallic processes.

References

- S. Kalpakjian, S. R. Schmid, Manufacturing Engineering and Technology 7th Edition, Prentice Hall, 2014.
- Dr. Mohd Shahir Kasim, Manufacturing Process Module 1 and 2
- M. P. Groover, Fundamentals of Modern Manufacturing, Materials, Processes and System 6th Edition, John Wiley & Sons, INC, 2015.

STATICS (DMFD 1823)

Course Learning Outcomes

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

(1) Describe the basic concepts and fundamental principles of statics.
(2) Solve equilibrium problems of a particle.
(3) Apply equilibrium of a rigid body concepts in engineering problems.

Synopsis

Statics is one of the primary topics of mechanics. Mechanics is the branch of physics that considers the action of forces on bodies that are at rest or in motion. This course is offered to study the mechanics of a particle and a rigid body at rest (statics). Topics include are: forces and equilibrium systems, moments and couples, structures and members, friction, centroids and moment of inertia.

References

- Hibbeler R.C., 2016, Engineering Mechanics – Statics, 14th SI Ed., Prentice Hall, New York.
- Beer, F. P. and Johnston Jr., E. R. and Eisenberg, E. R., 2018, Vector Mechanics for Engineers - Statics, 12th Ed. in SI Units, McGraw Hill, New York.
- Meriam, J. L. and Kraige L. G., 2016, Engineering Mechanics – Static SI Version, 8th Ed., John Wiley & Sons, New York.

ENGINEERING GRAPHICS & CAD (DMFD 1133)

Course Learning Outcomes

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

(1) Describe the basic graphic principles in generating an engineering drawing.
(2) Create clear and legible sketches to represent roughly the idea or object in mind.
(3) Generate engineering drawing in CAD software that can be interpreted by engineering professionals.

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 drawing that are neat, correctly dimensioned using industry standards. Students will use freehand sketches methods and CAD software to develop visualisation skills and create the engineering drawings.

References

- Giesecke, Mitchell, Spencer, Hill, Dygdon, Novak and Lockhart, Technical drawing with Engineering Graphics, Pearson, 15th Edition, 2015.
- Dix Riley, Discovering AutoCAD 2009, Pentice Hall, 2009.
- Zolkarnain Marjom, Hassan Attan, Engineering Graphics & CADD for Engineering Students, 2008.

APPLIED DYNAMICS (DMFD 1813)

Course Learning Outcomes

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

(1) Solve dynamics problems using the basic concept of kinematics, force and acceleration of a particle and a rigid body.
(2) Apply the concept and principle involving design mechanisms, balancing, and dynamic analysis in transmission elements, joints and bearings.
(3) Analyse problems in relation to mechanics of machines and its dynamics performance.

Synopsis

This course focuses on the fundamental of dynamics analysis and the principles of the mechanics of machines, with their application in practice. It also covers the basic concept of transmission elements including gear, screw, belt, joints, and bearings. Topics included are; kinematics for particle and rigid body, force and acceleration for particle and rigid body, transmission elements design, dynamic analysis, and its application on joints and bearings.

References

- Theory of Machines, RS Khurmi, JK Gupta, 14th Edition, S. Chand & Co. Ltd., New Dehli 2005.
- Hibbeler, R. C., Engineering Mechanics: Dynamics, 14th Edition, Pearson, 2016.
- Roslan A. R., Che Abas C. I. and Mohd Yunus A., Mekanik Mesin, Universiti Teknologi Malaysia, Johor, 2003.
- Ramamurti, V., Mechanics of Machines, 3rd Edition, Alpha Science International Ltd, U.K., 2012.
- Vinogradov, O., Fundamentals of Kinematics and Dynamics of Machines and Mechanisms, CRC Press, United States of America, 2000.
- Hibbeler, R.C., Engineering Mechanic: Statics and Dynamics, 13th Edition, Prentice Hall, 2013.

THERMOFLUIDS (DMFD 2833)

Course Learning Outcomes

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

(1) Apply the thermodynamic First Law and Second Law to determine the performance of thermal systems.
(2) Apply appropriate conservation equations in analyzing steady fluid problems.
(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 of the energy transformation, working fluids, theory and application of first and second laws of thermodynamics. The course also covers the explanation of the steam and gas power plant as a direct application of the thermodynamic theory. Students will be exposed in refrigeration system as an application on the thermodynamic principles. The second part of this course is to introduce the students to the basic of fluid mechanics. This consists of a 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

- Yunus A.C., John M.C., Robert H.T. (2016) Fundamentals of Thermal-Fluid Sciences, 5th Edition in SI Units, Mc Graw Hill.(textbook)
- Cengel, Y.A., Michael, A.B., (2014), 8th Edition, "Thermodynamics, An Engineering Approach", Mc Graw Hill, New York.
- Deborah A. Kaminsky and Michael K. Jensen, (2011), "Introduction to Thermal and Fluid Engineering", Updated Edition, John Wiley & Sons, Inc.
- Cengel, Y.A., Turner, R. H., Cimbala, J. M., (2016), 5th Edition in SI Units, "Fundamentals of Thermal-Fluid Sciences", Mc Graw Hill, New York.
- Eastop, T.D, McConkey, A., (2004), 5th Edition, "Applied Thermodynamics for Engineering Technologist", Longman.
- Young, D.F. Young, B.R. Munson, T.H. Okiishi, (2016), "Fundamental of Fluid Mechanics", 8th Edition, John Wiley & Sons, Inc.

ENGINEERING MATERIALS (DMFM 1253)

Course Learning Outcomes

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

(1) Describe the fundamental principles of engineering materials in terms of its structure.
(2) Explain the engineering materials properties based on its structure towards specific performance.
(3) Choose suitable processing methods according to their engineering materials structure and properties towards specific performance.

Synopsis

This course introduces students to basic concepts of engineering materials that covers interatomic bonding, crystalline structure, imperfections and diffusion in solids. Introduction to the binary phase diagrams is also provided. Explanation on various types of engineering materials (i.e. metals, ceramics, polymers, composites and semiconductors), their mechanical properties, basic processing techniques and applications are also included.

References

- William F. Smith & Javad Hashemi, Materials Science and Engineering, 5th Edition, McGraw Hill. 2017.
- William D. Callister & David G. Reithwisch, Materials Science and Engineering 9th Edition, John Wiley & Sons. 2014.
- Elliot P. Douglas, Introduction to Materials Science and Engineering, International Edition, Pearson. 2014.
- Shackelford, J.F. (2000) Materials Science and Engineering – An Introduction, 5th Edition. Prentice Hall.
- Michael F. Ashby, David R.H. Jones, Engineering Materials 1- An Introduction to Properties, Applications and Design, 5th Edition. Elsevier, Butterworth Heinemann. 2018.
- Budinski, K. G. and Budinski, M. K. (2005) Engineering Materials, 3rd Edition, Heinemann.
- Bolton, W. (2001) Engineering Materials Technology, 3rd Edition., BH Publisher.

MANUFACTURING PRACTICE (DMFD 1313)

Course Learning Outcomes

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

(1) Describe the basic engineering communication principle.
(2) Demonstrate proper use of basic engineering equipment and abide with safety requirements.
(3) Transform drawings to produce according to specifications.
(4) Perform finishing works and meeting tolerance.
(5) Apply measurement tools in dimensional metrology; the statistical process controls tools on quality issues.
(6) Work in group to complete project.

Synopsis

The practice consists of introduction to basic knowledge of using manual hand tools and equipment, machine tools, welding, fabrication, fitting, casting, milling, basic of electrical and electronics and some manual work within manufacturing daily activities including metrology. It introduces common equipment for performing manufacturing works such as lathe and milling machines, arc welding, TIG/MIG welding, sheet metal forming, basic foundry kit, 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. & Schmid S., Manufacturing Engineering and Technology, 7th Edition, Prentice Hall, 2014.
- Amstead B.H., Manufacturing Processess, 3rd John Wiley & Son, 1997.
- Mikell P. Groover, Fundamental of Modern Manufacturing, Prentice Hall Int. Ed. 1996.
- Kibbe, Neely, Meyer & White, Machine Tool Practices. 5th Edition. Prentice Hall, 1995.

CAD/ CAM (DMFM 1122)

Course Learning Outcomes

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

(1) Describe CAD/CAM system and application in industrial manufacturing.
(2) Apply basic principal of CAD/CAM methodology in creating 2D sketches, 3D models and CAM operation.
(3) Produce machining strategies and toolpath methods for milling and turning operations.
(4) Produce machining operations simulation and generate code prior to the machining process.

Synopsis

This course is an introduction to the CAD/CAM system and its application. The student will be exposed to the application of CAD/CAM software for generating geometric modeling and NC part programming. Students will create 2D graphic elements and apply geometric constraints, create geometric modelling and modifying using edit commands, generative drafting and edit drawing block, create CAM programming and perform machining simulation and also generate NC part programming. The machining simulation will present the machining operation prior to the actual machining process. Student will apply all the knowledge in doing group project in order to understand the process in CAD/CAM system and integration from CAD to CAM operation.

References

- P. N. Rao (2011), 7th Edition, CAD/CAM Principles and Applications, MGrawHill.
- Fred Karam, Charles Kliesmit (2004), Using CATIA V5, Thomson (Delmar Learning).
- T.C. Chang, Richard A. Wysk, H.P. Wang (2006), 3rd Edition Computer Aided Manufacturing, Prentice Hall.
- C. McMahon and Browne J., (2000), 2nd Edition CAD/CAM Principle, Practice and Manufacturing Management, Prentice Hall.

ENGINEERING SEMINAR (DMFD 2231)

Course Learning Outcomes

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

(1) Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to manufacturing engineering practice and solutions to well-defined engineering problems.
(2) Demonstrate the ability to discuss range of sustainability issues.
(3) Apply engineering management principles skills as individual or a leader in a team.
(4) Recognize the need for life-long learning 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.

QUALITY CONTROL (DMFD 2342)

Course 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 practices.
(2) Identify the manufacturing process and its capability using variable and attributes control
(3) Investigate the problems in manufacturing product using appropriate quality control tools.
(4) Design sampling method for quality control solutions.

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 philosophy and implementation of Lean concepts and the methodology of Six Sigma statistics.

Apart from providing sufficient theory to ensure a strong understanding of basic quality principles, the course also stressed on 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. (2018) Quality Improvement, 10th Edition, Prentice Hall.
- Donna C. S. Summers (2018) Quality. 6th Edition, Prentice Hall.
- Fryman, M.A. (2002) Quality and Process Improvement, Thomson Learning.
- Montgomery, D.C. (2012) Statistical Quality Control, 7th Edition, John Wiley and Sons, Inc.

FLUID POWER (DMFD 2413)

Course Learning Outcomes

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

(1) Distinguish the importance, applications, advantages and disadvantages of fluid power systems.
(2) Recognize the basic components and systems used in fluid power technologies in terms of its construction, symbol and principle.
(3) Calculate the parameters generated from fluid power systems.
(4) Design basic pneumatic/ hydraulic and electro pneumatic/hydraulic application circuits.

Synopsis

This course provides a basic introduction to the following basic concepts stress, strain and relating stress and strain in terms of materials behaviour. This course also considers basic applications of axial loading, torsion, bending, and fundamentals of indeterminate analysis. This course emphasizes on the basic system used in fluid power technologies namely hydraulics and pneumatics by detailing sections for each system. The syllabus covers the type of actuator used such as linear or rotary, control of valves by means of pressure, flow or directional, sources for each system and the components involved, as well as standard symbol for each components and design and analysis of circuit diagram for hydraulics and pneumatics respectively.

References

- Anthony Esposito, Fluid Power with Applications, 7th Edition, Pearson, 2013.*
- James L. Johnson, Introduction to Fluid Power, Delmar Thomson Learning, 2002.
- Arthur Akers, Hydraulic Power system Analysis, CRC taylor & Francis Group, 2006
- M. Galal Rabie, Fluid Power Engineering, Mc Graw Hill, 2009.

INSTRUMENTATION AND CONTROL (DMFD 2433)

Course Learning Outcomes

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

(1) Identify and describe different types of instrumentation and control system, its functional elements and operation principle.
(2) Solve for transient response, stability and steady-state error of first-order and second-order systems.
(3) Demonstrate instrumentation and control system with the aid of software.

Synopsis

This course is important to engineers because it prepares them with the basic techniques and knowledge of instrumentation and control system engineering. This course aims to motivate students through the application of instrumentation and control system theories, concepts and its relation to the real world. The course contents will expose students to analyze control systems in the industry and solve related problems in the manufacturing world today.

References

- Norman S. Nise, Control System Engineering, John Wiley, 7th Edition, 2015.
- Nur Aidawaty Rafan and Silah Hayati Kamsani, Control Systems Theory. Penerbit Universiti UTeM, Malaysia, 2015
- Tony R. Kuphaldt, Lessons In Industrial Instrumentation Version 1.0, 2009.
- Katsuhiko Ogata, MATLAB for Control Engineers, Pearson Education, 2008.
- Franklin W. Kirk et al, Instrumentation, 4th Edition, American Technical Publishers, 2005.

TOTAL PRODUCTIVE MAINTENANCE (DMFD 2512)

Course Learning Outcomes

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

(1) Identify the productivity problems in production line.
(2) Conduct investigation of the productivity problems.
(3) Design solutions for technical problems of the productivity problems.
(4) Apply the tools and techniques in TPM in analyzing the productivity problems

Synopsis

This course is important to engineers because it prepares them with the basic techniques and knowledge of Total Productive Maintenance. This course aims to motivate students through the application of Total Productive Maintenance theories, concepts and its relation to the real world. The course contents will expose students to analyze production maintenance in the industry and solve related problems in the manufacturing world today.

References

- Seiichi Nakajima, Introduction to TPM: Total Productive Maintenance, Productivity Press, Eleventh Printing edition, 1988.
- Steven Borris, Total Productive Maintenance: Proven strategies and techniques to keep equipment running at peak efficiency, McGraw-Hill, 2006.
- R. Keith Mobley, Lindley R. Higgins and Darrin J. Wikoff, Maintenance Engineering Handbook, Seventh Edition, McGraw-Hill, 2008.
- Tina Kanti Agustiady, Elizabeth A CudneyTotal Productive Maintenance: Strategies and Implementation Guide, CRC Press, 2015

DIPLOMA PROJECT 1 (DMFD 2822)

Course Learning Outcomes

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

(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 is the 1st part of Diploma Final Year Project. 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 product. Knowledge on 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 environment impacts and issues on sustainability is also covered in this course. The project in this course applies team based approached 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.

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References

- Chitale, A. K. and Gupta, R. C., Product Design and Manufacture, 6th Edition, Prentice Hall, New Delhi, India, 2013.
- Ulrich, K.T. and Eppinger, S. D. Product Design and Development, 5th Edition, McGraw Hill, 2012.
- Kalpakjian, S. and Schmid, S. R., Manufacturing Engineering & Technology, 4th Edition, Prentice Hall.

DIPLOMA PROJECT 2 (DMFD 3823)

Course Learning Outcomes

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

(1) Identify manufacturing engineering problem and apply knowledge in providing design solutions.
(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 Design Project.
(5) Communicate effectively in completing the Design Project.

Synopsis

This the final part of Diploma Final Year project. Diploma Project 2 focuses on integration of learning principles in multidisciplinary application for a product design project and prototype development that include marketing, concept design, material selection, process selection and sustainability, project management, and manufacturing cost. As a result students will gain appreciation for the interdisciplinary cooperation and for the complex and essential roles played by various members of the product development teams. This design project applies team-based approach. The team-based approach will improve teamwork and communication skills in accordance to the realities of industrial practice. Students are expected to be exposed to complex and essential team roles during the development of the design project. Emphasize is also given on issues related to material selection using CES EduPack, quality of the prototypes produced and marketability of the design projects.

References

- Ulrich, K. T. and Eppinger, Steven D., 2016, Product Design and Development, 6th Edition, McGraw Hill.
- Chitale, A. K. and Gupta, R. C., 2014, Product Design and Manufacture, 6th Edition, Prentice Hall, New Delhi, India.
- Kalpakjian, S. and Schmid, S. R., 2013, Manufacturing Engineering & Technology, 7th Edition, Prentice Hall.
- Cross, Nigel, (2010) Engineering Design Methods, Wiley.
- W.Bolton, Mechatronics electronic control systems in mechanical and electrical engineering, 5th Ed., Prentice Hall, 2013.
- Kutz, Myer, Mechanical Engineers Handbook - Manufacturing and Management, 4th ed., John Wiley 2015.

MECHANIC OF MATERIALS (DMFD 2853)

Course Learning Outcomes

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

(1) Describe the basic concept of stress and strain.
(2) Explain the fundamental concept in application involving axial loading, torsion and bending, including introductory-level statically indeterminate systems.
(3) Apply the concepts of stress and strain in solving engineering problems.

Synopsis

This course provides a basic introduction to the following basic concepts stress (a means for quantifying internal force intensity), strain (a means for quantifying intensity of deformation), relating stress and strain in terms of materials behaviour. This course also considers the basic applications of the concept of axial loading (implicit in our basic consideration of stress and strain), torsion (stress and deformation caused by twisting of shafts), bending (stress and deformation caused by bending and fundamentals of indeterminate analysis (an introduction to the analysis of systems that are statically indeterminate).

References

- Beer, F.P., Johnston, Jr E.R., Dewolf, J.T., Mazurek, D. 2016, Mechanics of Materials, 7th Ed.,McGraw Hill India.
- Hibbeler, R.C., 2016, Mechanics of Materials, 10th Ed., Prentice Hall
- Gere, J.M., 2009, Mechanics of Materials Science & Engineering, 7th Ed., Cengage Learning

CNC TECHNOLOGY (DMFD 2333)

Course Learning Outcomes

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

(1) Describe the concept of CNC system.
(2) Produce correct programming codes.
(3) Produce product using CNC machine simulator.

Synopsis

Introduction and definition of CNC. The differences between conventional machine and CNC machine. The advantages of CNC machines. The type of CNC. Programming planning. Programming structure methodology. Programming techniques. How to coordinate and control lathe and milling machine. Tool selection. Safety factor at CNC machines.

References

- J. V. Valentino and J. Goldenberg, (2012) 5th Edition, Introduction to Numerical Control (CNC), Pearson Prentice Hall
- Peter Smid, (2003),3rd Edition, CNC Programming Handbook, Industrial Press
- Warren S. Seames, (2007) 4th Edition Computer Numerical Control – Concept and Programming, Delmar
- Steve Krar, Arthur Gill & Peter SMid, (2001), 1st Edition, Computer Numerical Control Simplified, Prentice Hall.

OCCUPATIONAL SAFETY AND HEALTH (DMFD 2382)

Course Learning Outcomes

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

(1) Explain the different requirements and regulations of Factory and Machinery Act, Occupational Safety and Health Act.
(2) Identify various safety, health, and environment hazards that affect human being.
(3) Apply various requirements on safety and health principles on working environment.
(4) Analyse scenarios in manufacturing industries that are subjected to Factory and Machinery Act, Occupational Safety and Health Act.

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 environment hazard that affects human being. The skills and knowledge of this area are crucial for students to accommodate them in the future.

References

- Goetsch, D. L. (2018). Occupational Safety and Health for Technologists, Engineers, and Managers, 9th Edition, Upper Saddle River, NJ: Prentice Hall.
- Reese, C. D. (2015). Occupational Health and Safety Management, A Practical Approach. Lewis Publishers, 3rd Edition, A CRC Press Company.
- Anton, T. J. (1989). Occupational Safety and Health Management 2nd Edition, New York, NY: McGraw-Hill, Inc.
- Undang-undang Malaysia, (2005). Akta Keselamatan dan Kesihatan Pekerjaan 1994 dan peraturan-peraturan, MDC Publishers Sdn Bhd.

JIGS & FIXTURES (DMFD 2422)

Course Learning Outcomes

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

(1) Analyze the design of jigs and fixtures in manufacturing in term of principles, characteristics and materials

(2) Investigate the jigs and fixtures problem in manufacturing based on its standards.

(3) Design the appropriate jigs and fixtures for the cases study given using CAD/CAM.

Synopsis

This course will introduce the student to the complex field on Jig & Fixture Design with respect to the manufacturing industry. This creative, lab oriented, problem solving course includes the generation of complete working drawings (using ISO/CSA drafting standards) from initial concept to the final outcome. The method of instruction will be: topical lectures, discussion and design development at the computer work station.

References

- Prakash Hiralal Joshi, Jigs and Fixtures: Design Manual, MacGraw-Hill Professional Engineering, 2002.
- Prakash Hiralal Joshi, Jigs and Fixtures, MacGraw-Hill Education,Third Edition, 2010.
- Grover, M.P. (2010). Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 4th Edition. Wiley.
- Serope Kalpakjian, Steven R. Schmid, Manufacturing Processes for Engineering Materials, 5th. Edition. Prentice Hall, 2018

MANUFACTURING MANAGEMENT (DMFD 2513)

Course Learning Outcomes

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

(1) Describe the fundamental concepts and principles of manufacturing management.

(2) Explain basic tools and techniques in managing the manufacturing industry.

(3) Apply appropriate tools or techniques in solving management problems or issues in manufacturing industry.

Synopsis

Manufacturing management consists of production and operational management, which emphasize on the elements and application of manufacturing. Tools, methods, and applications are introduced in this syllabus.

References

- William Stevenson, Operation Management, 13th Edition, McGraw-Hill 2017.
- Robert Jacobs, Richard Chase. Operations and Supply Chain Management,15th Edition, McGraw-Hill / Irwin, 2017.
- Jay Heizer, Barry Render. Operations Management, 12th Edition, Pearson 2016.

INDUSTRIAL AUTOMATION (DMFD 2563)

Course Learning Outcomes

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

(1) Demonstrate basic skills to control, manipulate and program an industrial robot.
(2) Define robot configuration concepts and its advantages.
(3) Apply Programmable Logic Controller (PLC) in a simple manufacturing system.
(4) Solve basic manufacturing automation calculation.

Synopsis

Robotics and Automation subject introduces students to the automation aspect that can be applied in manufacturing systems. The use of robot, CNC machines, automated guided vehicle (AGV), machine vision, programmable logic controller (PLC), electrical circuit programming and other advanced automation technologies will be given as a fundamental to the students to pursue higher level activities in larger scale industrial automation system. In practical session students are exposed to the real PLC programming as the one applied in the manufacturing industry.

References

- Asfahl, C.R. (1992) Robot and Manufacturing Automation, John Wiley & Sons, New York
- Groover, M.P. (2018) Automation, Production Systems and Computer-Integrated Manufacturing, 5th edition, Prentice Hall, New Jersey.
- Considine, Douglas M. (1986) Standard Handbook of Industrial Automation, 1st Edition, Chapman and Hall.
- Groover, M.P. (2015) Fundamental of Modern Manufacturing: Materials, Processes and Systems, 6th edition, Prentice Hall.

INDUSTRIAL TRAINING (DMFU 3368)

Course Learning Outcomes

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

(1) Show technical competencies and skills gained throughout their Internship.
(2) Prepare a report on the industrial field daily activities in the log book systematically.
(3) Produce industrial training report
(4) Communicate effectively with staff, colleagues and other personnel.
(5) Practice professional ethics in accordance with industry rules and regulations.

Synopsis

Students are expected to be involved in the areas such as; manufacturing / production process and / or its optimization process, mechanical design and product / system development, maintenance and repair of machineries or equipments, and product testing & quality control.

References

- Faculty of Manufacturing Engineering Student's Log Book.
- Faculty of Manufacturing Enginering Industrial Training Guide Book.

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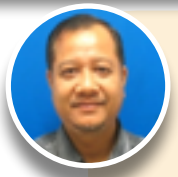

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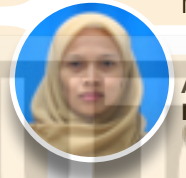
Research interests: Concurrent Engineering; New Product Development; Green Design; 3D Modeling; Finite Element



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Research interests: Thin Film Coating, Manufacturing Management

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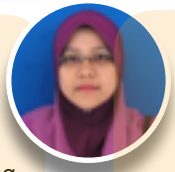
Research interests: Intelligent Agent; Automated Guided Vehicle; Material Transportation System; Computer Integrated Manufacturing



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B.Eng. Materials Engineering (USM)
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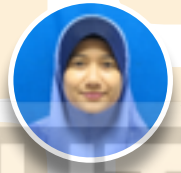
Research Interests: Rubber/Polymer Composites, Green Materials, Body Armour Materials, Nanoparticles Reinforcement



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B.Eng. Manufacturing Engineering (Univ. Islam Antarabangsa Malaysia)
M.Sc. Manufacturing System Engineering (Univ. of Warwick, UK)
Ph.D. Manufacturing Engineering and Operation Management (Nottingham University, UK)

Research interests: Welding and Near Net Shape Manufacturing Processes

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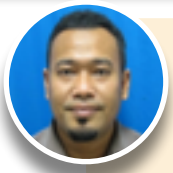
B.Sc. Manufacturing Engineering (UTM)
M.Sc. Engineering Management (UPM)
Ph.D. Manufacturing System (UPM)

Research interests: Operation Research, Manufacturing System, Technology Management

ASSOCIATE PROFESSOR



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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 interests: CAD/CAM & CNC Machining

Associate Professor Dr. Seri Rahayu binti Kamat, CEng
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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: Industrial Engineering, Operation Management, Production Planning, Industrial Ergonomics, Occupational Safety and Health and Biomechanics.

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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

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B.Eng. Chemical (Lakehead University, Ontario)
M.Eng. Manufacturing System (UKM)
Ph.D. in Control Engineering (Katholieke Universiteit Leuven, Belgium)

Research interests: Control Systems, Mechatronics

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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, Production Performance Measure, Lean Manufacturing, Agile Manufacturing, Sustainable Manufacturing

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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. Manufacturing (Manufacturing Management) (UTeM)
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Ph.D. Mechanical Engineering (Sustainable Manufacturing) (The University of Manchaster, UK)

Research interests: Operations Management

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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

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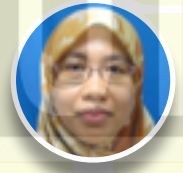
B.Eng. Mechanical Precision Engineering (Utsunomiya University, Japan)
B.A. Business Administration (Honors) Marketing (UiTM)
M.Sc. Mechanical Engineering (Utsunomiya University, Japan)
Ph.D. Production Information (Utsunomiya University, Japan)

Research interests: Kansei Robotic (Human-Robot Interface); Technology and Innovation Management; Mobile Robotics and Vision Automated Manufacturing



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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

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B.Eng. Mechanical Engineering (UiTM)
M.Sc. Mechanical Engineering (UiTM)
Ph.D. in Mechanical Engineering (Universiti Teknologi MARA)

Research interests: Industrial Ergonomics, Occupational Safety & Health

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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

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B.Eng. Manufacturing Engineering (UIAM)
M.Sc Manufacturing System Engineering (Coventry University, UK)
Ph.D. Control Engineering (UTeM)

Research interests : Control System; RFID; Automation

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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

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B.Sc. Industrial Physics (UTM)
M.Sc. Physics (UTM)

Research interests: Physics

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M.Sc. Manufacturing System Engineering (Coventry University, UK)
Ph.D. Mechanical & Materials Engineering (UKM)

Research interests: New Product Development

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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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Research interests: Advanced Manufacturing Technology & Design

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B.Eng. Electronics Engineering (University Of Kyoto, Japan)
M.Sc. Advanced Materials, Process & Manufacturing (University Of Hull, UK)
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Research interests: Functional Polymers, Polymer Composites, Green Materials

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Research interests: Physics, Mathematics

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Ph.D. Electrical Engineering (Imperial College London, UK)

Research interests: Robotics; Industrial Automation

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Dipl.Ing. (FH) Mechanical Engineering (Albstadt-Sigmaringen University, Germany)
M.Sc. Mechatronics (Aachen University, Germany)
Ph.D. Packaging Electronic (Mechanical) (USM)

Research interests: Electronic Packaging; Applied CFD; Green Energy System; Mechatronic Design

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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

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B.Eng. Mechatronics (UIAM)
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Research interests: Indoor Navigation; Automated Guided Vehicle; Internet of Things

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Research interests: Industrial Engineering, Design for Manufacture and Assembly, Product Design and Development

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Research interests: Project Management, Facilities Management

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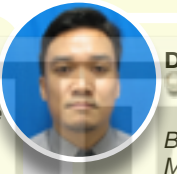
Ph.D. Innovative Technology and Science (Kanazawa University, Japan)

Research interests: Mechanical System Engineering



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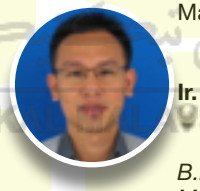
Research interests: Superconductor, Nanomaterials,Electroceramics, Advanced Materials



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B.Eng. Mechanical Engineering (UNITEN)
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Ph.D. Manufacturing Systems Engineering (RMIT University, Australia)

Research interests: Automation; Control System; Robotics; RMS; FMS

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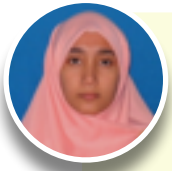
B.Eng. Material Science Engineering (Yamaguchi University, Japan)
M. Eng. Materials Science & Engineering (Shibaura Institute of Technology, Japan)
Ph.D. Regional Environment Systems (Shibaura Institute of Technology, Japan)

Research interests: Material Science Engineering; Electrochemistry; Corrosion Degradation Coating



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B.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)

Research interests: Operations Management, Productivity Improvement, Industrial Ergonomics

Nor Akramin bin Mohamad
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M.Eng. Mechanical Engineering (Advanced Manufacturing Technology) (UTM)

Research interests: Quality and Reliability, Operations Management

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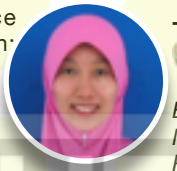
B.Eng. Mechanical Engineering (Universiti Teknologi Petronas)
M.Eng. Manufacturing Engineering (UM)
Ph.D. Control Engineering (UTeM)

Research interests: Systems and Control; Mechatronics; Industrial Automation



Ts. Dr. Rose Farahiyan binti Munawar
rosefarahiyan@utem.edu.my

B.Tech. Industrial Technology (USM)
M.Sc. Industrial Technology (USM)
Ph.D. Material Science (UKM)

Research interests: Nanotecnology (Nanomaterials & Nanocomposite), Green Materials, Materials Characterization

Dr. Saifudin Hafiz bin Yahaya
saifudin@utem.edu.my

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 Modeling; Mathematical and Computer Modeling

SENIOR LECTURERS

Dr. Suriati binti Akmal
suriatiakmal@utem.edu.my

B.Eng. (Manufacturing) (UIAM)
M.Sc. Global Production Engineering (Technische Universitaet Berlin, Germany)
Ph.D. Electronic and Information Engineering (Toyohashi University of Technology, Japan)

Research interests: Knowledge Engineering; Design Process; Green Manufacturing

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, Corrosion Metallurgy

Dr. Syamimi binti Shamsuddin, CEng
syamimi@utem.edu.my

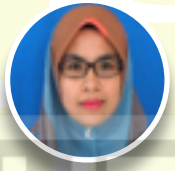
B.Eng. Manufacturing Engineering (UKM)
M.Sc. Mechatronics (Loughborough Univ., UK)
Ph.D. Mechanical Engineering (UiTM)

Research interests: Human-Robot Interaction (HRI); Humanoid Robot; Rehabilitation Robotics; Autism Rehabilitation; Kansei Engineering

Dr. Radin Zaid bin Radin Umar, CEng
radinzaid@utem.edu.my

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)

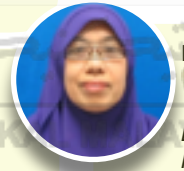
Research interests: Ergonomic Design



Dr. Rahimah binti Ab 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)

Research interests: Product Design; Production Engineering



Dr. Rosidah binti Jaafar
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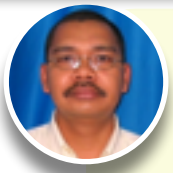
B.Eng. Mechanical (USM)
M.Eng. Mechanical – Advanced Manufacturing Technology (UTM)
Ph.D. Mechanical Engineering (University of Leeds, UK)

Research interests: CADCAM; Engineering Design

SENIOR LECTURERS



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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

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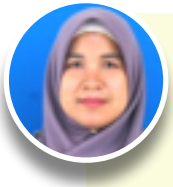
B.Eng. Material
(International Islamic University Malaysia)
M.Eng. Material
(International Islamic University Malaysia)
Ph.D. in Mechanical Engineering (Toyohashi University of Technology, Japan)

Research interests: Ceramic, Biomaterials, Thermal Spray Coating, Materials Characterization



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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

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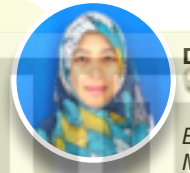
B.Sc. Mechanical Eng. Manufacturing
(University of Western Ontario, Canada)
M.Eng. Mechanical – Advanced Manufacturing Technology (UTM)
Ph.D. Mechanical Engineering (University of Melbourne, Australia)

Research interests : Additive manufacturing, 3D Printing, Design for Manufacture Assembly, Spatial Visualisation, Reading Interpreting Engineering



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B.Sc. Mechanical Engineering (Mechanics & Materials) (UKM)
M.Sc. Mechanical Engineering (Advanced Material: Polymer) (UKM)
Ph.D. Mechanical Engineering (University of Sheffield, UK)

Research interests: Non-metal Composite Materials, Fiberisation Manufacturing Micromechanics & Single Fibre Analytical Analysis

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B.Sc. Mechanical Engineering
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M.Sc. Computer Integrated Manufacturing
(Loughborough University, UK)

Research interests: Rapid Prototyping; FEA; Product Design

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B.Eng. Materials (UM)
M.Sc. Materials Engineering (UM)

Research interests: Biomaterials Coating

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B.Eng. Mechanical Engineering (UNITEN)
M.Eng. Global Production Manufacturing
(Technical University of Berlin, Germany)

Research interests: Production Engineering & Operations Management

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M.Eng Manufacturing Engineering (Industrial Engineering), UTeM

Research interests: Industrial Engineering, Manufacturing Management

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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

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B.Eng. Mechanical Engineering (UTM)
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Research interests: Product Design; Engineering Design; Syntheses and Analysis; Vibration and Noise

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B.Eng. Manufacturing Engineering (Robotics & Automation) (UTeM)
M.Eng. Manufacturing System (UPM)

Research interests: Automation; Green Technology; Mobile Robot

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B.Eng. Engineering/CADCAM (UM)
M.Eng. Manufacturing (UM)
Ph.D. Mechanical Science and Bioengineering (Osaka University, Japan)

Research interests Biomechanics; Computational Modeling and Simulation; Additive Manufacturing (Bioprinting).

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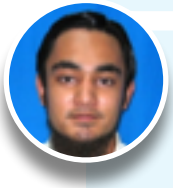
B.Sc. Applied Science (Mathematics & Economy) (USM)
M.Sc. Statistics (USM)

Research interests: Mathematics, Operational Research



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B.Eng. Engineering Industry Ergonomics (Univ. of Wisconsin Madison, USA)
M.Sc. Industrial Engineering (Ergonomics) (University of Wisconsin Madison, USA)
Ph.D. Occupational Safety and Health (UPM)

Research interests: Industrial Ergonomics, Occupational Safety & Health

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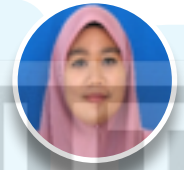
B.Eng. Production System Engineering (Toyohashi University of Technology, Japan)
M.Sc. Mechanical Engineering (Utsunomiya University, Japan)
Ph.D. Mechanical and Materials Engineering (UKM)

Research interests: Product Design; Green Manufacturing



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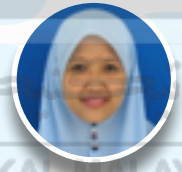
B.Sc. Mathematics (USM)
M.Sc. Mathematics (USM)

Research interests: Mathematics



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B.Sc Manufacturing Engineering (UIA)
M.Sc. Advance Manufacturing Technology (University of Portsmouth, UK)

Research interests: Rapid Product Development

Sayed Kushairi bin Sayed Nordin
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Research interests: Applied Statistics; Econometrics; Panel Data

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M.Sc. Mechatronics (Loughborough Univ., UK)
Ph.D. Mechanical Engineering (Mobile Robotic) (UTM)

Research interests: Robotic; Mobile Robot; Mobile Manipulator; Active Force Control

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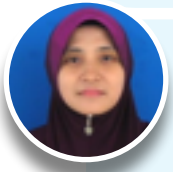
B.Eng. Manufacturing Engineering with Management (USM)
M.Eng. Manufacturing Engineering (UNSW, Australia)
Ph.D. Mechanical Engineering (University of Birmingham, UK)

Research interests: Continuous optimization; Industrial automation



Siti Rahmah binti Shamsuri
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B.Eng. Material Engineering (USM)
M.Eng. Mechanical (Materials) (UTM)

Research interests: Corrosion, Metallic material

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Head of Assistant Engineer
(*Performing as function*)

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Assistant Engineer

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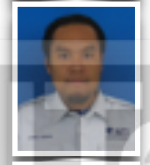
Certificate of Mechanical Engineering - Materials (Johor Baharu Polytechnic)

Bahatiar bin Zaid
bahatiar@utem.edu.my
Certificate of Manufacturing Engineering (Port Dickson Polytechnic)



Hairulhisham bin Rosnan
hairulhisham@utem.edu.my
Certificate of Mechanical Engineering (Sultan Hj. Ahmad Shah Polytechnic)

Hasnorizal bin Hairuddin
hasnorizal@utem.edu.my
Certificate of Manufacturing Engineering (Sultan Haji Ahmad Shah Polytechnic)

Mazlan bin Mamat@Awang Mat
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Certificate of Manufacturing Engineering (Johor Baharu Polytechnic)

Mohd Farihan bin Mohammad Sabtu
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Diploma of Mechanical Engineering - Manufacturing (Sultan Mizan Zainal Abidin Polytechnic)

Mohd Ghazalan bin Mohd Ghazi
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Certificate of Mechanical Engineering (Automotive)(Dungun Polytechnic)
Diploma of Mechanical (Automotive) (Kota Baharu Polytechnic)

Mohd. Hairrudin bin Kanan
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Certificate of Mechanical Engineering - Manufacturing (Johor Bahru Polytechnic)
Diploma in Mechanical Engineering (Merlimau Polytechnic)

Mohd. Nazri bin Abd Mokte
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Diploma of Engineering (UTM)

Mohd Taufik bin Abd. Aziz
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Diploma Kemahiran Malaysia - Production (Batu Pahat, ADTEC)

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zahar@utem.edu.my
Certificate of Mechanical Engineering - Manufacturing (Johor Baharu Polytechnic)

Muhammad Azwan bin Abdul Kadir
azwan@utem.edu.my
Diploma Pengajar Vokasional Kebangsaan (CIAST)

Muhammad Helmi bin Kahar
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Diploma of Mechanical Engineering - Technology Manufacturing (Johor Baharu Polytechnic)

Nizamul Ikbal bin Khaeruddin
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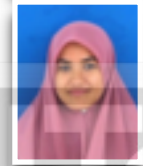
Certificate of Mechanical Engineering – Manufacturing (Port Dickson Polytechnic)



Norzuriyahni binti Abu Bakar
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Diploma of Technology Manufacturing (Batu Pahat ADTEC)

Shamsiah Hasita binti Shafie
hasita@utem.edu.my
Certificate of Technology Manufacturing (Port Dickson Polytechnic)

Siti Aisah binti Khadisah
sitiaisah@utem.edu.my
Diploma Kemahiran Malaysia - Production (Batu Pahat ADTEC)

STAFF DIRECTORY

ADMINISTRATIVE STAFF

Senior Assistant Registrar

Noor Asyikin binti Sulaiman
asyikin@utem.edu.my
Bachelor of Management (Honours) (USM)

Assistant Registrar

Norazah binti Mohamed Yazid
norazah@utem.edu.my
Diploma in Business Studies (UiTM)
Bachelor of Business Administration (Hons) Marketing (UiTM)

Assistant Administration Officer

Masuriya Hani binti Ab Wahid
masuriya@utem.edu.my
Bachelor of Applied Arts with Honour - Art Management (UNIMAS)
M.A. Malay Letters (UKM)

Assistant Accountant

Khairul Faiz bin Zainal
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Diploma in Accounting (Polytechnic Merlimau)

Administration Assistant (Secretarial)

Noor Azian binti Mahmood
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Diploma in Secretarial Science (UiTM)

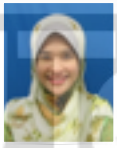
Nur Hidayah binti Mustafah
nurhidayah@utem.edu.my
Diploma in Secretarial Science (Politeknik PD)

Senior Administration Assistant (Clerical)

Abdul Rahman Rosli Bin Mahmood
roslimahmood@utem.edu.my
Sijil Tinggi Pelajaran Malaysia

Administration Assistant (Clerical)

Fadzly bin Nordin
fadzly@utem.edu.my
Sijil Pelajaran Malaysia



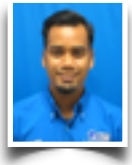
Amiza Binti Hj Talib
amiza@utem.edu.my
Diploma In Public Admin

Siti Rohani Binti Manan
sitirohani@utem.edu.my
Sijil Pelajaran Malaysia

Administration Assistant (Financial)

Siti Suhailin Binti Mohd Sidek
suhailin@utem.edu.my
Diploma Applied Science

Operation Assistant



Mohamad Akhir bin Yawah
mohamad.akhir@utem.edu.my
Sijil Pelajaran Malaysia

LABORATORIES AND FACILITIES

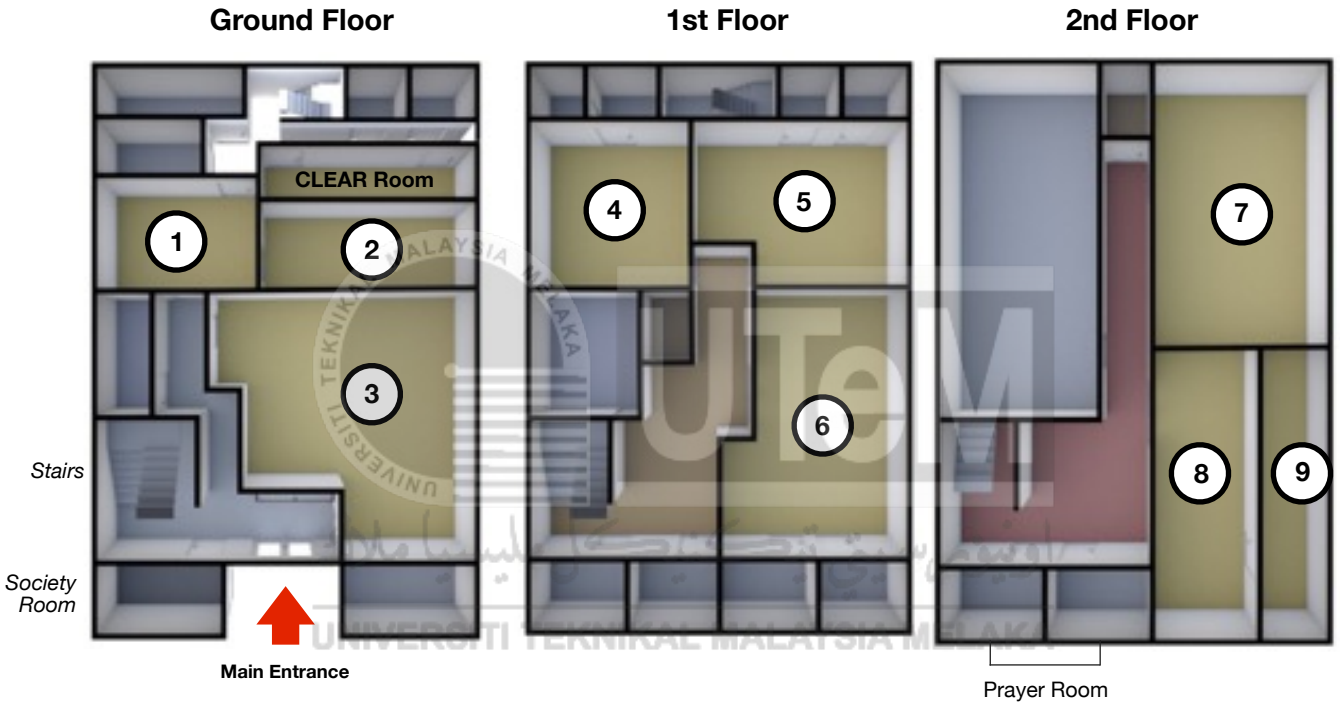
Laboratories

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. In total, the faculty is equipped with 28 laboratories and workshops.

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.

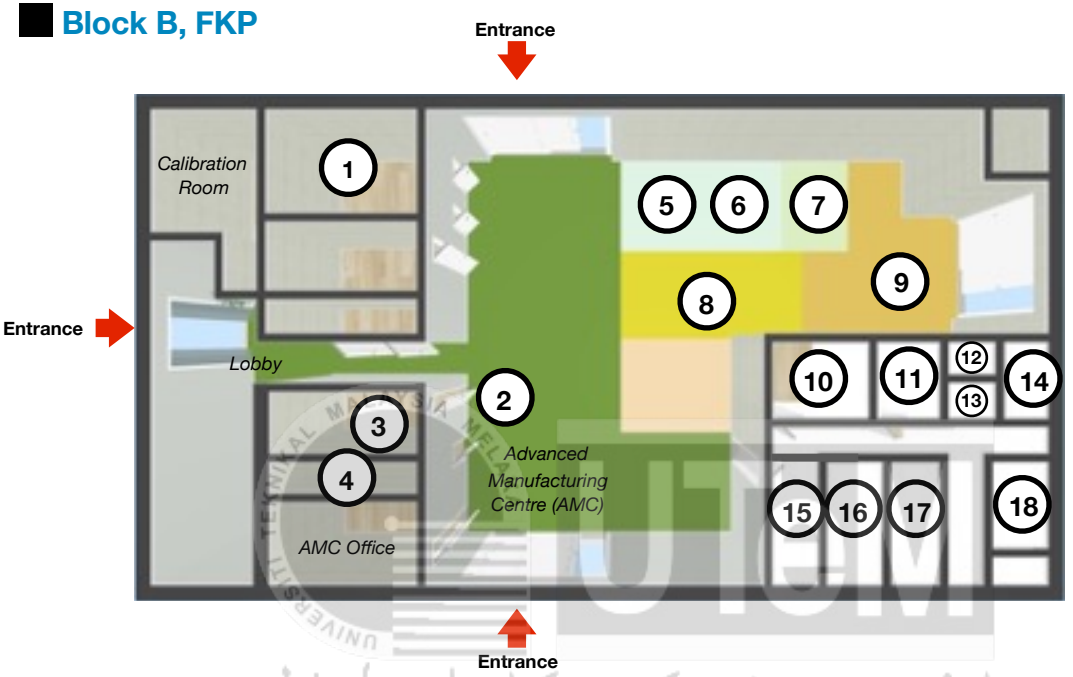
Location of Laboratories

Block A, FKP



Laboratories		Assistant Engineer
(1)	Industrial Automation Lab	Muhammad Azwan bin Abdul Kadir
(2)	CIM/FMS Lab	Muhammad Azwan bin Abdul Kadir
(3)	Fluid Power Lab	Shamsiah Hasita binti Shafie
(4)	CAD/CAM Lab	Mohd Zahar bin Sariman @ Sarman
(5)	Engineering Graphics Lab 1	Hasnorizal bin Hairuddin
(6)	Engineering Graphics Lab 2	Hasnorizal bin Hairuddin
(7)	BYOD Room	Mohd Zahar bin Sariman @ Sarman
(8)	Work Physiology Room	Mohd Zahar bin Sariman @ Sarman
(9)	Ergonomic Lab	Mohd Zahar bin Sariman @ Sarman

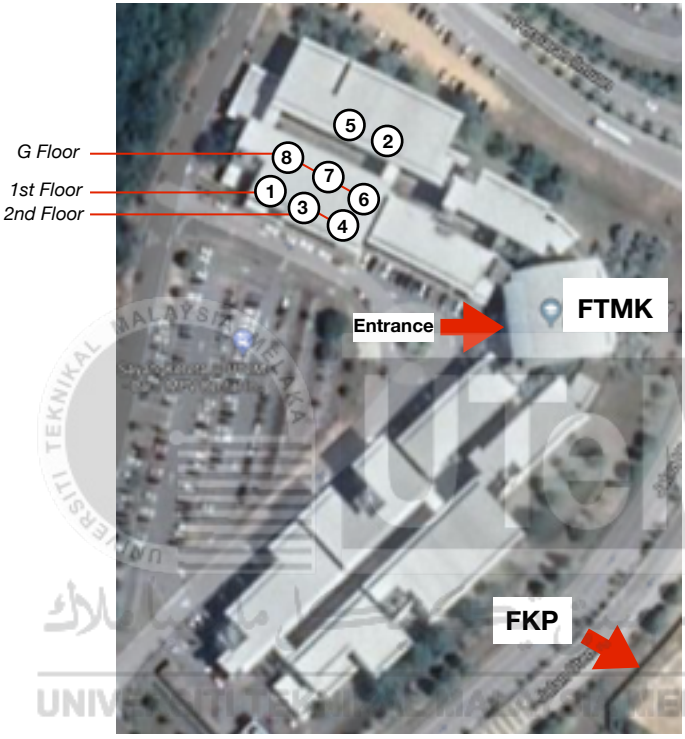
Block B, FKP



Laboratories		Assistant Engineer
(1)	Metrology Lab	Siti Aisah binti Khadisah
(2)	Mould-Die Lab	Mohd Hanafiah bin Mohd Isa
(3)	CNC Lab	Mohd Taufik bin Abd Aziz
(4)	CNC Train Lab	Mohd Taufik bin Abd Aziz
(5)	Fabrication Workstation	Mohd Ghazalan bin Mohd Ghazi
(6)	Fitting Workstation	Norzuriyahni binti Abu Bakar
(7)	Casting Workstation	Norzuriyahni binti Abu Bakar
(8)	Machine Shop Workstation	Mazlan bin Mamat @ Awang Mat
(9)	Welding Workstation	Nizamul Ikbal bin Khaeruddin
(10)	Robotic Lab	Ahmad Faizul bin Ahmad Tajudin
(11)	Control & Instrumentation Lab	Ahmad Faizul bin Ahmad Tajudin

Laboratories		Assistant Engineer
(12)	Synthesis Room	Mohd Farihan bin Mohammad Sabtu
(13)	Material Selection Room	Mohd Farihan bin Mohammad Sabtu
(14)	Polymer Lab	Mohd Farihan bin Mohammad Sabtu
(15)	Material Lab 1	Hairulhisham bin Rosnan
(16)	Material Lab 2	Hairulhisham bin Rosnan
(17)	Composite Lab	Muhammad Helmi bin Kahar
(18)	Ceramic Lab	Muhammad Helmi bin Kahar

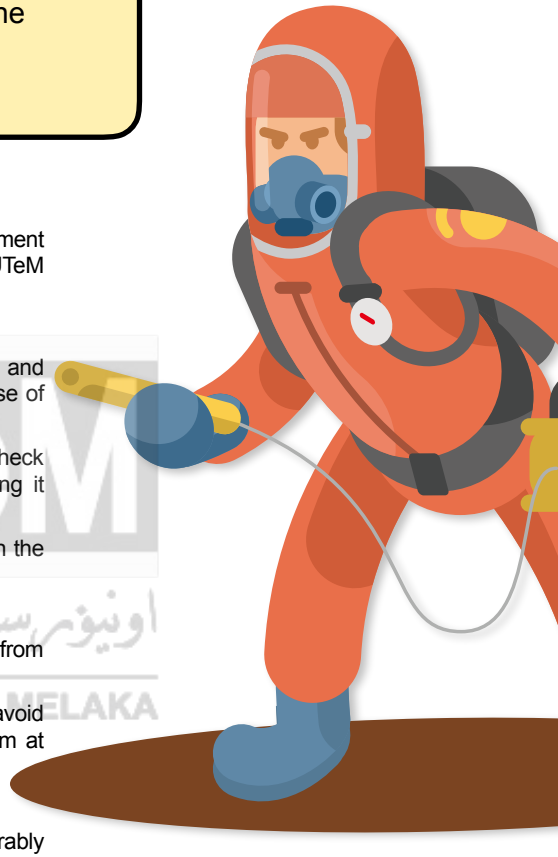
Laboratory Block, FTMK



Laboratories		Assistant Engineer
(1)	Physics Lab 1	Bahatiar bin Zaid
(2)	Physics Lab 2	Bahatiar bin Zaid
(3)	Industrial Engineering Lab 1	Mohd. Nazri bin Abd. Mokte
(4)	Industrial Engineering Lab 2	Mohd. Nazri bin Abd. Mokte
(5)	Basic Mechanics Lab	Muhamad Asari bin Abdul Rahim
(6)	Mechatronics Lab	Muhamad Asari bin Abdul Rahim
(7)	Design Manufacturing Lab	Mohd Hairrudin bin Kanan
(8)	Rapid Prototyping Lab	Mohd Hairrudin bin Kanan

Lab Safety Guidelines

Students shall abide to the laboratory guidelines at ALL times.



General Laboratory Procedures

(1) All procedures at FKP laboratory are according to FKP Lab Quality Management System (SPKM) available at the labs. Students are also to abide 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 FKP 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.

Dress Safely

(1) All students are required to wear their FKP 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.

(2) 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.

(3) Wear clean, properly fitted eye protection. Always wear personal protective equipment such as safety glasses, goggles, or face shields where required.

(4) Shoes must be worn in all FKP 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.

(5) Ring, wrist watches, bracelets can get caught on equipment and cause serious injury.

(6) 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 FKP 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.

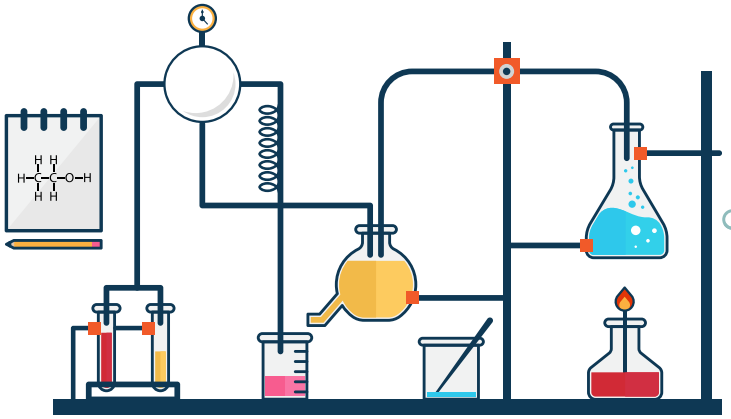
(5) Keep flammable liquids away from all sources of heat. An empty container can hold enough liquid or vapors to support an explosion.

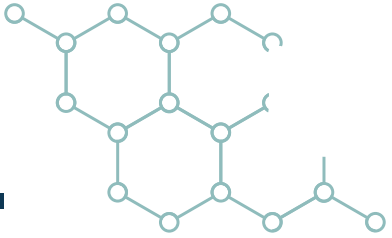
(6) Clean up spills immediately; the longer the liquid vaporizes the more hazardous the area becomes.

(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

(5) Always inform FKP staff immediately when you or another student are injured, no matter how slight the injury.

(6) 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.

(7) 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

(8) Ensure that the laboratory areas have adequate lighting to perform the work safely

(9) 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 FKP management.

Emergency Contacts

The following contact numbers are useful in the case of emergency:

UTeM's clinic (Main Campus)	06 - 5552076
Melaka Hospital	06 - 2892543
Pejabat Keselamatan	06 - 3316020
Rakan Keselamatan Universiti (RKU)	012 - 2946020
Ayer Keroh Police Station	06 - 2321222
Ayer Keroh Fire and Rescue Brigade	06 - 2319154
Emergency (police/fire brigade/hospital)	999

QUALITY ASSURANCE SYSTEM

The university has obtained the MS ISO 9001:2000 Quality System Certificate in March 2005. The certificate is for the scope of Design and Development of Programs as well as Delivery of Services for Bachelor Degree as an effort to deliver a high quality education services. The ISO 9001:2000 Quality System approvals was presented after a five-day auditing done by the SIRIM Sdn. Bhd. The ISO 9001:2000 certificate acknowledges the standards of operations in UTeM.

EXTERNAL EXAMINERS

Professor Ir. Dr Jahara binti A. Ghani
Professor,
Faculty of Engineering and Built Environment (UKM, Malaysia)

- *Ph.D. Machining Process (UM, Malaysia)*
- *M.Sc. Manufacturing Systems Engineering (Uni. of Warwick, UK)*
- *B.Sc. (Hons) Manufacturing Systems Engineering (Leeds Polytechnic, UK)*

INDUSTRIAL ADVISORY PANEL

Tuan. Hj Abdul Razak bin Hashim
Perusahaan Otomobil Nasional Sdn Bhd (PROTON)

En. Jendra bin Afrizal Boleh
Perusahaan Otomobil Nasional Sdn Bhd (PROTON)

En. Mohd Fairuz bin Alias
Emerson Process Management (M) Sdn. Bhd.

Ir. Hanizan bin Mohd Husin
Malaysian Refining Company Sdn Bhd (MRCSB)

En. Ku Azrin Ku Mohamad
PETRONAS Lubricants International Sdn. Bhd

Ir. Zaidah binti Idris
AECOM Perunding Sdn. Bhd

En. Mohd Noor Fahmi bin Wichi
OneSubsea Malaysia System Sdn Bhd (A Schlumberger Company)

MAP

New FKP Building
Expected to move: December 2019

Block B *Block A*

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