Buku Panduan Sidang Akademik 2006/2007

Fakulti Kejuruteraan Pembuatan

Kolej Universiti Teknikal Kebangsaan Malaysia

Buku Panduan
Fakulti Kejuruteraan Pembuatan
2006

CONTENTS

1. FOREWORD BY THE DEAN

Assalamualaikum wrth. wbt.

In the name of Allah, Most Gracious, Most Merciful

Alhamdullillah, with God's will this Academic Handbook 2006/2007 has been successfully published.

I would like to take this opportunity to congratulate all students for your academic achievement and qualify yourself to be admitted into this university and this Faculty to be more precise.

This academic Handbook is prepared to assist students in getting to know their own faculty and the departments as well as to understand the academic system practiced in this university such as the semester system, academic rules and regulations as well as the curriculum which the students will pursue.

It has been our highest priority, through this Handbook, to help all students to plan for their academic studies in line with the University's aim and philosophy to produce highly competent professionals who will become the industries' preference. We also hope that the amenities provided by the faculty will be used wisely and with full responsibility. Your ability to plan your study scheme through suitable selection of courses will be the basic requirement in maximizing the usage of facilities provided for the purpose of gaining knowledge and skills.

I would like to thank and congratulate all parties that has put their effort in making this book a success. Hopefully, this cooperation will continue in the future in updating and enhancing the effectiveness of this Handbook.

Thank you.

Wassalam

Professor Dr. Mohd. Razali bin Muhamad
Dean, Faculty of Manufacturing Engineering
B.Sc (Hons.) Production Engineering and Management (Loughborough Univ.)
M.Sc Materials Protection (Loughborough Univ.)
PhD Manufacturing Systems, (The Univ. of Liverpool)

2. KOLEJ UNIVERSITI TEKNIKAL KEBANGSAAN MALAYSIA

2.1 Introduction

Kolej Universiti Teknikal Kebangsaan Malaysia (KUTKM) was established under Section 20 University and University College Act 1971 (Act 30) through "Perintah Kolej Universiti Teknikal Kebangsaan Malaysia (Pemerbadanan 2001)" gazette as P.U. (A) 124 on 3rd of May 2001. It was formally operated on the 1st of Dicember 2001.

2.2 Vision

To Be One Of The World's Leading Innovative And Creative Technical Universities.

Mision

To Produce Higly Competent Professionals Through World Class Higher Technical Education Based On Application-Oriented Teaching, Learning And Research With Smart University-Industry Partnership In Line With National Aspirations.

2.3 Objectives

- To nurture KUTKM as a learning and knowledge organization
- To produce graduates who are highly competent with high moral values, who are industry's first choice and well recognized by the society and nation as a whole
- To provide world class disciplinary and interdisciplinary professional courses that is application oriented and intellectually challenging
- To develop a curriculum reflecting all dimensions of the discipline and encourages critical thingking, problem solving, teamwork and social skills
- To recruit, train and develop highly qualified and competent staff with vast experience
- To lead research and development (R&D) activities and consultation through industrial problem solving

- To provide infractructure and environment conducive for:
  - Hands-on teaching and learning
  - University-Industry relationship/collaboration
  - Applied research development
  - In-house industrial training
  - Consultancy & continuing education
  - Caring and friendly work condition

- To create and maintain a smart partnership between University-industry:
  - In teaching and learning
  - Courses development
  - Research, development and consultancy
  - Incubator and teaching factory
  - Industrial training

3. FACULTY OF MANUFACTURING ENGINEERING

3.1 Introduction to Manufacturing Engineering

Manufacturing or production is a process of transforming raw material into a product. It includes designing and producing products through various production methods and machines. Manufacturing activity is the backbone of a nation's development since it contributes between 20 - 30 percent of Gross National Product (GNP). Generally, as a nation's manufacturing activity increases, it will actually improve the standard of living of its populace.

Manufacturing Engineering is a branch of engineering that requires knowledge and experience in order to fully grasp, exploit and control all the engineering techniques in manufacturing process and methods of producing products. It also require 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 KUTKM is developed to instill a strong engineering basics and engineering core, so that graduates of this program are proficient in solving manufacturing engineering problems. Theoretical aspects learnt are equipped with practical sessions, analogous with the engineering education approach of application oriented. This will ensure graduates of manufacturing engineering are able to function effectively in their career.

Among careers that are available for manufacturing engineering graduates are process engineer, design engineer, automation engineer, material engineer and production engineer. Besides working in private and government sectors, the syllabus provides a strong basic for its graduates to turn out to be entrepreneurs. In which ever field they decide to involve, we are confident that graduates from Manufacturing Engineering will be able to contribute to the nation's industrial development.

3.2 Introduction to The Faculty of Manufacturing Engineering

Faculty of Manufacturing Engineering was officially established on the 22nd of June 2001 after approval by the Ministry of Education. The first course offered was Bachelor of Manufacturing Engineering (Manufacturing Proces) in November 2001.

However, foreseeing the nation's fast-moving industrial development and its need for professional human resources in manufacturing engineering, the Faculty has added up new courses in the various fields of manufacturing engineeringwith approval from the ministry starting from 14 April 2002. Now, the Faculty has 6 programs offered:

1. Bachelor
   i. of Manufacturing Engineering: Manufacturing Process
   ii. of Manufacturing Engineering: Robotic & Automation
   iii. of Manufacturing Engineering: Manufacturing Design
   iv. of Manufacturing Engineering: Engineering Materials
   v. of Manufacturing Engineering: Manufacturing Management

2. Diploma of Manufacturing Engineering

The faculty also offers post graduate programs by research.

3.3 Faculty Strategic Statement

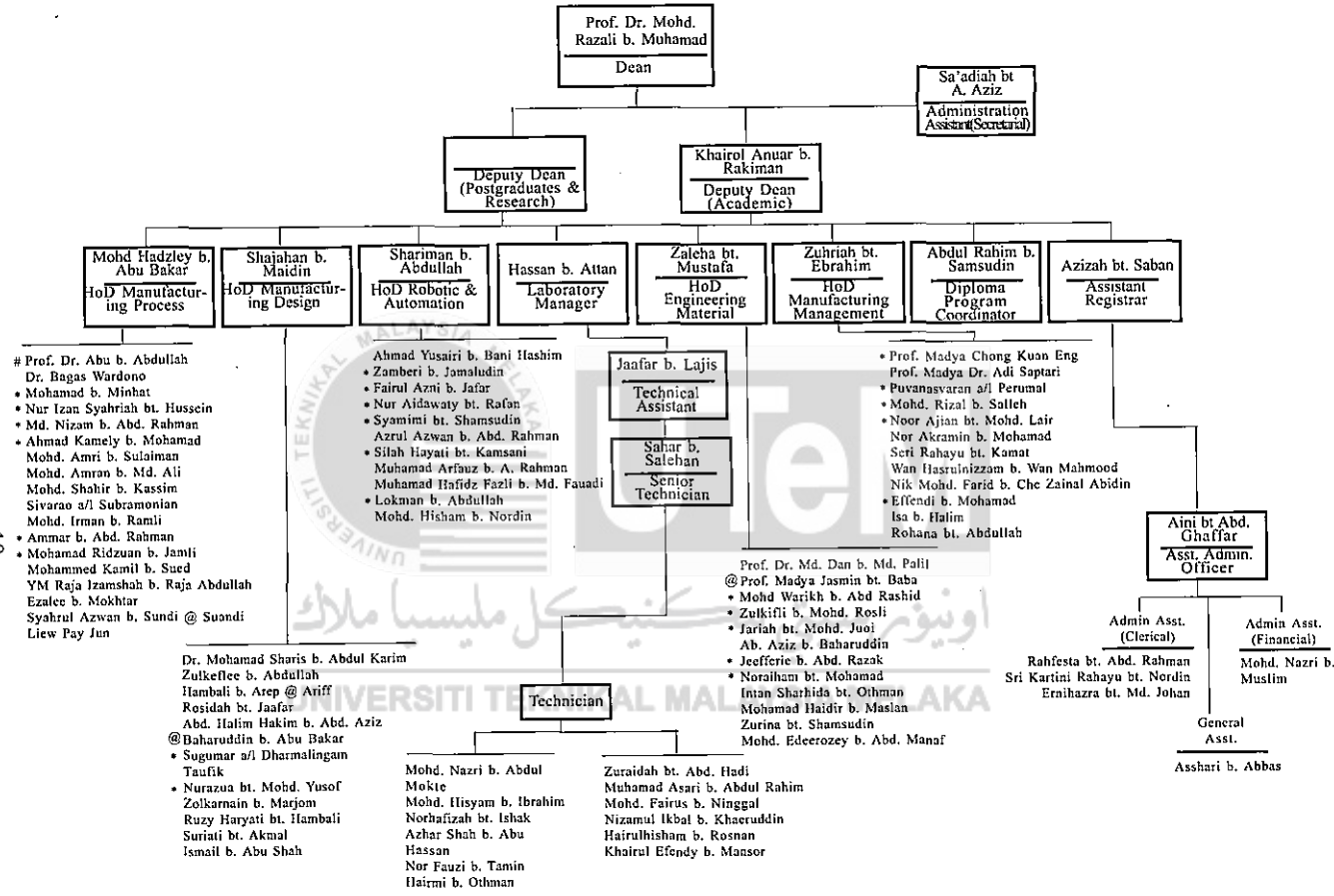
Vision

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

Mission

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

FACULTY OF MANUFACTURING ENGINEERING



Secondment to Chansellory
@ Secondment to UNIC
• Study Leave
All Academic Staff are involve in Diploma Program
29 Jun 2006

From left to right:
En. Shariman bin Abdullah - Head of Department (Robotic & Automation)
En. Hassan bin Attan - Laboratory Manager
En. Abdul Rahim bin Samsudin - Diploma Program Coordinator
En. Khairol Anuar bin Rakiman - Deputy Dean (Academic)
Prof. Dr. Mohd Razali bin Muhamad - Dean
En. Mohd Hadzley bin Abu Bakar - Head of Department (Manufacturing Process)
Cik Zuhriah bt Ebrahim - Head of Department (Manufacturing Management)
Cik Zaleha bt Mustafa - Head of Department (Engineering Material)

4. ACADEMIC SYSTEM

4.1 KUTKM Academic System

KUTKM 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 a week mid semester break. Students will continue another 7 weeks second part lecture before a 3 weeks final examination.

Learning process in KUTKM includes lecture, tutorial, written assignments, practical, laboratory and studio assignments and projects which will be done either by individual or by group work. A Bachelor Degree student has to fulfill all credit hour required to graduate within 8 - 12 semesters while a diploma student has to do so between 6 – 10 semesters to graduate.

4.2 Entry Requirement

4.2.1 Bachelor Degree Program

The qualifications for candidate to enter the Bachelor's Degree course are as follows;

1. Pass SPM/equivalent reasonably well;
2. Pass with credit in Bahasa Melayu/Bahasa Malaysia at the SPM/equivalent level;
3. Pass Matriculation Program reasonably well; OR
4. Pass STPM Examination with at least Grade C in the subject of General Studies and in two other subjects (Mathematics, Physics and Chemistry); OR
5. Pass Polytechnic Certificate/Diploma reasonably well in related field; OR
6. Certificate(s) from other institutions recognized by the Government and approved by the University's Senate equivalent to Polytechnic Certificate; AND
7. Has taken the Malaysia University English Test (MUET)

4.2.2 Diploma Program

The qualifications for candidate to enroll in the Diploma program course are as follows:

University's General Requirement

1. Pass SPM or equivalent with a minimum 5Cs for the subjects inclusive of:
   a. Bahasa Malaysia
   b. Mathematics
2. Pass English in SPM

Program Special Requirements

1. Fulfill the condition of University's General Requirement with minimum 3Cs for the subjects below;
   a. Additional Mathematics
   b. Physics
   c. Additional Science
   d. Science/Engineering Science
   e. Chemistry
   f. Electronics Technology
   g. Engineering Technology
   h. Electrical Engineering & Electronics or Machinery
   i. TV and Radio Services
   j. Electrical Installation and Control
   k. Geometry and Electronics Drawing
   l. Geometry and Machine Drawing/Machinery/Metal Fabrication
   m. Geometry and Automotive Drawing
   n. Geometry and Building Structure Drawing/Air-Conditioning
   o. Engineering Drawing
   p. Geography/Biology
   q. Arts/Design
   r. Principles of Accountancy or Basic Economic or Commerce
   s. History
   t. English/Higher Arabic Language
   u. Islamic Studies/Moral or Pendidikan Syariah Islaimiah or Al-Quran & As-Sunnah Studies

   - One of the subject must be in the range of a - h

2. A related Malaysian Polytechnic Certificate or equivalent

(Priority will be given to candidates who fulfill the requirement in 1 examination)

4.3 Academic Calender 2006/2007

2 July 2006 – 8 July 2006	New Student Orientation Week/Subject Registration
10 July 2006 – 21 July 2006	Fined Late Subject Registration For Semester I 06/07 Session
10 July 2006 – 25 December 2006	Semester I (24 weeks)
10 July 2006 – 26 August 2006	Lecture (First Part – 7 weeks)
5 July 2006	*Special Examination and Result Senate Committee Meeting for Semester II, 2005/2006 session
26July 2006	*Examination and Result Senate Committee Meeting for Special Semester, 2005/2006 session
16 August 2006	Senate Meeting
27 August 2006 – 3 September 2006	Middle Semester Break (1 week)
31 August 2006	Independence Day
4 September 2006 – 21 October 2006	Lecture (Second Part – 7 weeks)
13 September 2006	Senate Meeting
2 October 2006 – 20 October 2006	Compulsory Subject Registration for Semester One 06/07 Session (3 weeks)
24 September 2006	*1st of Ramadhan
14 October 2006	Birthday of Yang DiPertua of Malacca
11 October 2006	Senate Meeting
21 October 2006	Deepavali
22 October 2006 – 5 November 2006	Study Leave (2 weeks)
24 – 25 October 2006	*Eid Mubarak
6 – 26 November 2006	Semester One Final Exam (3 week)
8 November 2006	Senate Meeting
26 November 2006 – 25 December 2006	Semester Break (4 weeks)
4 December 2006 – 27 April 2007	Industrial Training (Bachelor Program - 20 weeks)
6 December 2006	Senate Meeting
21 December 2006	*Examination and Result Senate Committee Meeting for Semester I, 2006/2007 Session
25 December 2006	Christmas
26 December 2006 – 1 July 2007	Semester II (19 weeks)
26 December 2006 – 9 Februari 2007	Lecture (First Part – 7 weeks)
26 December 2006 – 5 Januari 2007	Fined Late Subject Registration For Semester II Sesi 06/07
31 December 2006	*Hari Raya Qurban
8 Januari 2007 – 13 Januari 2007	Semester I, Special Examination
1 Januari 2007	New Year
10 Januari 2007	Senate Meeting
24 Januari 2007	*Special Examination and Result Senate Committee Meeting For Semester I, 2006/2007 Session
18 – 19 Februari 2007	*Chinese New Year
14 Februari 2007	Senate Meeting
10 – 20 Februari 2007	Mid Semester Break (1 week)

21 Februari 2007 – 6 April 2007	Lecture (Second Part – 7 weeks)
7 Mac 2007	Senate Meeting
19 Mac 206 – 6 April 2007	Compulsory Subject Registration For Semester I, 07/08 Session (3 weeks) Special Semester Subject Registration, 06/07 Session (3 Weeks)
19 Mac 2007 – 6 April 2007	Study Week (1 week)
7 April 2007 – 15 April 2007	*Birthday of Prophet Muhammad S.A.W.
31 Mac 2007	Declaration Historical City of Malacca
15 April 2007	Final Examination for SSmester II (3 weeks)
16 April 2007 – 4 Mei 2007	Senate Meeting
11 April 2007	Labor Day
1 Mei 2007	Industrial Training (Diploma Program – 10 weeks)
7 Mei 2007 – 2 July 2007	Semester Break (8 weeks)
5 Mei 2007 – 1 July 2007	Senate Meeting
9 Mei 2007	* Examination and Result Senate Committee Meeting for Semester II,
6 June 2007	2006/2007 Session Special Examination For Semester II, 2006/2007 Session
11 June 2007 – 15 June 2007	* Special Examination and Result Senate Committee Meeting for Semester II,
4 July 2007	2006/2007 Session
7 Mei 2007 – 29 June 2007	Special Semester (8 weeks)
25 July 2007	*Examination and Result Senate Committee Meeting for Special Semester, 2006/2007 Session
1 July 2007 – 7 July 2007	New Student Orientation Week/Subject Registration
2 July 2007 – 13 July 2007	Fined Late Subject Registration For Semester I 07/08 Session

4.4 Grading System Schedule

Marks	Grade	Grade Point	Status
85 -100	A	4.0	Excellent
80 - 84	A-	3.7	Excellent
75 - 79	B+	3.3	Honors
70 - 74	B	3.0	Honors
65 - 69	B-	2.7	Honors
60 - 64	C+	2.3	Pass
55 - 59	C	2.0	Pass
50 - 54	C-	1.7	Conditional Pass
45 - 49	D+	1.3	Conditional Pass
40 - 44	D	1.0	Conditional Pass
00 - 39	E	0.0	Fail

4.5 Grade Point Average Calculation

GPA (*Grade Point Average*) is a grade point average earned by student in a semester. It is calculated as below;

$$\text{Total Grade Point (TGP)} = k_1 \times m_1 + k_2 \times m_2 + \ldots\ldots\ldots + k_n \times m_n$$
$$\text{Total Calculated Credit (TCC)} = k_1 + k_2 + \ldots\ldots\ldots + k_n$$

$$\text{GPA} = \frac{\text{Total Grade Point}}{\text{Total Calculated Credit}}$$

$$= \frac{k_1 \times m_1 + k_2 \times m_2 + \ldots\ldots\ldots + k_n \times m_n}{k_1 + k_2 + \ldots\ldots\ldots + k_n}$$

With
k_1, k_2. = Subject credit hour
m_1, m_2. = Grade point earned
n = Number of subjects registered in the semester

4.6 Cumulative Grade Point Average Calculation

CGPA (*Cumulative Grade Point Average*) is a grade point average earned by a student inclusive all semesters he/she registers. It is calculated as below;

$$\text{CGPA} = \frac{(JMN)_1 + (JMN)_2 + \ldots\ldots\ldots (JMN)_n}{(JKK)_1 + (JKK)_2 + \ldots\ldots\ldots (JKK)_n}$$

With
$(JMN)_1, (JMN)_2$ = Total grade point earned in a semester
$(JKK)_1, (JKK)_2$ = Total calculated credit in a semester
n = total semester registered

5. Outcome Based Education

5.1 Program Educational Objectives (PEO)

a) Have strong understanding of fundamental and interdisciplinary engineering knowledge.
b) Are skilled and competent to analyze, solve problems and conduct research in the manufacturing engineering field.
c) Are able to communicate and work in teams effectively
d) Possess leadership and managerial skills with ethical standard
e) Creative and innovative in fulfilling the needs of industry and society

5.2 Program Outcomes (PO)

Graduates from the Manufacturing Engineering program must have;

PO1 : The ability to apply basic knowledge of sciences, engineering and technology in their profession.
PO2 : The ability to design, develop, implement and maintain manufacturing systems.
PO3 : The ability to analyze problems and synthesis solutions in manufacturing engineering.
PO4 : The ability to communicate effectively with both the engineers and also the society.
PO5 : An understanding of the engineering ethics and social responsibility.
PO6 : Ability to utilize a systems approach to design and evaluate operational performance.
PO7 : Having in-depth technical competence in a specific engineering discipline.
PO8 : Ability to function effectively as an individual and in a group with the capacity to be a leader or manager as well as an effective team member.
PO9 : The ability to design and conduct experiments as well as to analyze and interpret data
PO10 : The ability to function and multi-disciplinary teams.
PO11 : The knowledge of contemporary issues.

6. ACADEMIC ADVISORY SYSTEM

The Academic Advisory System is designed to help students maintain or increase their academic performance through out the years until graduation. Every student will be assigned to a lecturer, as an academic advisor, to be monitored. An Academic Advisor plays a vital role in assisting student in planning and executes their study plan throughout their years in KUTKM. Students may also require their advice besides academic matters but will eventually effects their academic performance.

Academic Advisor Responsibility

Students are responsible to discuss their study plan every semester with their academic advisor. Some of the important information Academic Advisor needs to explain to the students are subject status such as Compulsory Attendance, Attendance Only and so on. Students also need to be explained about prerequisite subjects and as an Academic Advisor, students aptitude needs to be assessed to ensure credit hour and subjects registered by student are suitable with their capability..

In detail, Academic Advisor is responsible to;

1. Meet up with students in the first week of the semester and explain in general about the Semester System and related issues concerning learning process as well as monitoring students' performance.

2. Advice and assist students in preparing their study plan throughout their four years of study in KUTKM such as subject to be registered every semester, credit hour and so on.

3. Informing the Faculty's Administration concerning students performance and problems.

4. Check and verify subjects registered for the examination.

5. Monitor students' performance and make amendment to the study plan according to students' performance (if necessary).

6. Verify students subject dropping applications.

7. Advising and explaining the effects of registering and dropping of subjects.

Students' Responsibility

Students are responsible to consistently meet with their academic advisor to get advice and help in solving any academic problems that arise. Students need to consult their academic advisor every semester before registering their subject for the respective semester.

7 BACHELOR DEGREE PROGRAM

7.1 Bachelor of Manufacturing Engineering (Manufacturing Process)

Bachelor of Manufacturing Engineering (Manufacturing Process) was the first program offered in November 2001 together with the setting up of the Department of Manufacturing Process. The program is intended to fulfill the government's aspiration to produce multi-skilled graduates in the field of science and technology.

In this program, students will be educated with mathematical principles, engineering science and manufacturing technology. Students will be exposed to various engineering metallic & non-metallic material processing techniques. Graduates from this program are expected to have strong engineering background and skills required to build their career as Process Engineers, Production Engineers, Manufacturing Engineers, Sales Engineers, Machine Tool Designers and Manufacturing Engineering Consultants.

By-Semester Subject Schedule

First Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACW 1332	Philosophy of Science & Technology	2	2	0
BACW 1412	Technical Communication I	2	1	2
BMFG 1823	Statics & Strength of Materials	3	2	3
BMFR 1113	Engineering Graphics & CADD	3	1	4
BMFS 1313	Manufacturing Practices	3	0	9
BACS 1213	Engineering Mathematics	3	2	3
BMFG 1812	Introduction to Manufacturing Engineering	2	1	2
	Total	18	9	23

First Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum I	1	0	3
BACW 1342	TITAS	2	2	0
BMFG 1833	Mechanics of Machine	3	2	3
BACS 1223	Differential Equation	3	2	3
BENG 1113	Electric & Electronic Principle	3	2	3
BITG 1113	Computer Programming	3	1	3
BACS 2213	Statistics & Probabilities	3	2	3
	Total	18	11	18

Second Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACW 1322	Malaysia Socio-Economic Development	2	2	0
BMFG 2813	Thermo-Fluid	3	2	3
BMFA 2413	Control System	3	2	3
BMFB 2213	Engineering Materials	3	2	3
BACS 2222	Numerical Method	2	2	2
BMFS 2513	Manufacturing Processes I	3	2	3
	Total	16	12	14

Second Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum II	1	0	3
BACW 1352	Ethnic Relation	2	2	0
BACW 2412	Technical Communication II	2	1	2
BMFA 2433	Mechatronic System	3	2	3
BMFR 2113	Product Design & Development	3	2	3
BMFP 2522	Quality & Reliability	2	1	3
BMFS 2523	Manufacturing Processes II	3	2	3
	Total	16	10	17

Third Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACS 3412	Technical Communication III	2	1	2
BMFP 3513	Industrial Engineering	3	2	3
BMFP 3542	Engineering Metrology	2	1	3
BMFR 3143	Production Tool Design	3	1	4
BMFS 3313	Simulation in Production System	3	2	3
BMFS 3323	Advanced Manufacturing Processes	3	2	3
BMFS 3333	Non-Metallic Processes	3	2	3
	Total	19	11	21

Third Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 3926	Industrial Training	6		
BMFG 3946	Industrial Training Repot	6		
	Total	12		

Fourth Year - First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 4912	Bachelor Degree Project I	2	0	6
BMFG 4812	Engineers In Society	2	2	0
BMFG 4912	Business Entrepreneurship	2	2	0
BMFS 3373	CNC Technology	3	2	3
BMFA 3443	Industrial Automation	3	2	3
BMFB 4263	Materials Selection	3	2	3
BMFP 4542	Project Management	2	1	3
	Total	17	11	18

Fourth Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 4924	Bachelor Degree Project II	4	0	12
BMFP 4513	Production Planning & Control	3	2	3
BMFR 4113	CAD/CAM	3	1	4
BMFP 4523	Lean Manufacturing	3	2	3
BMFS 4313	Advanced CNC Machining	3	2	3
	Total	16	7	25

Curriculum Schedule

Bachelor Of Manufacturing Engineering (Manufacturing Process)

	First Year		Second Year		Third Year		Fourth Year		Total
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	
University Compulsory Subject	BACW 1332 Philisophy of Science & Technology	BKK* ***1 Co-Curriculum I	BACW 1322 Malaysia Socio-Economic Development	BKK* ***1 Co-Curriculum II	BACW 3412 Technical Communication III				16
	BACW 1412 Technical Communication I	BACW 1342 Titas		BACW 1352 Ethnic Relation					
				BACW 2412 Technical Communication II					
Program Core Subject	BACS 1213 Engineering Mathematics	BACS 1223 Differential Equation	BMFG 2813 Thermo Fluid	BMFP 2522 Quality & Reliability	BMFP 3513 Industrial Engineering	BMFG 3926 Industrial Training	BMFG 4912 Bachelor Degree Project I	BMFG 4924 Bachelor Degree Project II	90
	BMFG 1823 Statics & Strength of Materials	BENG 1113 Electric & Electronic Principle	BMFB 2213 Engineering Materials	BMFA 2433 Mechatronic System	BMFP 3542 Engineering Metrology	BMFG 3946 Industrial Training Report	BMFG 4812 Engineer In Society	BMFR 4113 CAD/CAM	
	BMFR 1113 Engineering Graphics & CADD	BITG 1113 Computer Programming	BMFA 2413 Control System	BMFR 2113 Product Design & Development			BMFG 4912 Business Entrepreneurship	BMFP 4513 Production Planning & Control	
	BMFS 1313 Manufacturing Practices	BACS 2213 Statistics & Probabilities	BACS 2222 Numerical Methods	BMFS 2523 Manufacturing Processes II			BMFS 3373 CNC Technology		
	BMFG 1812 Introduction to Manufacturing Engineering	BMFG 1833 Mechanics of Machine	IBMFS 2513 Manufacturing Processes						
Department / Course Subjects					BMFR 3143 Production Tool Design		BMFA 3443 Industrial Automation	BMFS 4313 Advance CNC Machining	26
					BMFS 3323 Advance Manufacturing Processes		BMFB 4263 Materials Selection	BMFP 4523 Lean Manufacturing	
					BMFS 3313 Simulation In Production System		BMFP 4542 Project Management		
					BMFS 3333 Non-Metallic Processes				
Total	18	18	16	16	19	12	17	16	132

7.2 Bachelor of Manufacturing Engineering (Manufacturing Design)

Manufacturing Design is a branch of manufacturing engineering that focuses on design function in the effort to reduce product manufacturing cost. Students with strong manufacturing engineering background will be further exposed to techniques and approaches in design for manufacturing and assembly. The skills will help them in designing products and cost-effective system with high quality as well as environmentally safe.

Graduates from this course will have the knowledge and competencies required to become Design Engineers, Manufacturing Engineers, Sales Engineers, Designers, Design Instructors and Design Consultants.

By-Semester Subject Schedule

First Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACW 1332	Philosophy of Science & Technology	2	2	0
BACW 1412	Technical Communication I	2	1	2
BMFG 1823	Statics & Strength of Materials	3	2	3
BMFR 1113	Engineering Graphics & CADD	3	1	4
BMFS 1313	Manufacturing Practice	3	0	9
BACS 1213	Engineering Mathematics	3	2	3
BMFG 1812	Introduction to Manufacturing Engineering	2	1	2
	Total	18	9	23

First Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum I	1	0	3
BACW 1342	TITAS	2	2	0
BMFG 1833	Mechanics of Machine	3	2	3
BACS 1223	Differential Equation	3	2	3
BENG 1113	Electric & Electronic Principle	3	2	3
BITG 1113	Computer Programming	3	1	3
BACS 2213	Statistics & Probabilities	3	2	3
	Total	18	11	18

Second Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACW 1322	Malaysia Socio-Economic Development	2	2	0
BMFG 2813	Thermo-Fluid	3	2	3
BMFA 2413	Control System	3	2	3
BMFB 2213	Engineering Material	3	2	3
BACS 2222	Numerical Method	2	2	2
BMFS 2513	Manufacturing Process I	3	2	3
	Total	16	12	14

Second Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum II	1	0	3
BACW 1352	Ethnic Relation	2	2	0
BACW 2412	Technical Communication II	2	1	2
BMFA 2433	Mechatronic System	3	2	3
BMFR 2113	Product Design & Development	3	2	3
BMFP 2522	Quality & Reliability	2	1	3
BMFS 2523	Manufacturing Process II	3	2	3
	Total	16	10	17

Third Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACS 3412	Technical Communication III	2	1	2
BMFP 3513	Industrial Engineering	3	2	3
BMFP 3542	Engineering Metrology	2	1	3
BMFR 3143	Production Tool Design	3	1	4
BMFR 3153	Computer Aided Engineering Analysis	3	2	3
BMFR 3123	Ergonomics in Design	3	2	3
BMFR 3113	Engineering Graphics & CADD II	3	1	4
	Total	19	10	22

Third Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 3926	Industrial Training	6		
BMFG 3946	Industrial Training Repot	6		
	Total	12		

Fourth Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 4912	Bachelor Degree Project I	2	0	6
BMFG 4812	Engineers In Society	2	2	0
BMFG 4912	Business Entrepreneurship	2	2	0
BMFS 3373	CNC Technology	3	2	3
BMFR 4143	Design For Manufacturing & Assembly	3	2	3
BMFR 4133	Design Project	3	0	6
BMFR 4173	Design For Environment	3	2	3
	Total	18	10	21

Fourth Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 4924	Bachelor Degree Project II	4	0	12
BMFP 4513	Production Planning & Control	3	2	3
BMFR 4113	CAD/CAM	3	1	4
BMFR 4152	Design Case Study	2	0	4
BMFR 4123	Rapid Manufacturing	3	2	3
	Total	15	5	26

Curriculum Schedule

Bachelor of Manufacturing Engineering (Manufacturing Design)

	First Year		Second Year		Third Year		Fourth Year		Total
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	
University Compulsory Subject	BACW 1332 Philisophy of Science & Technology	BKK* ***1 Co-Curriculum I	BACW 1322 Malaysia Socio-Economic Development	BKK* ***1 Co-Curriculum II	BACW 3412 Technical Communication III				16
	BACW 1412 Technical Communication I	BACW 1342 Titas		BACW 1352 Ethnic Relation					
				BACW 2412 Technical Communication II					
Program Core Subject	BACS 1213 Engineering Mathematics	BACS 1223 Differential Equation	BMFG 2813 Thermo Fluid	BMFP 2522 Quality & Reliability	BMFP 3513 Industrial Engineering	BMFG 3926 Industrial Training	BMFG 4912 Bachelor Degree Project I	BMFG 4924 Bachelor Degree Project II	90
	BMFG 1823 Statics & Strength of Materials	BENG 1113 Electric & Electronic Principle	BMEB 2213 Engineering Materials	BMFA 2433 Mechatronic System	BMFP 3542 Engineering Metrology	BMFG 3946 Industrial Training Report	BMFG 4812 Engineer In Society	BMFR 4113 CAD/CAM	
	BMFR 1113 Engineering Graphics & CADD	BITG 1113 Computer Programming	BMFA 2413 Control System	BMFR 2113 Product Design & Development			BMFG 4912 Business Entrepreneurship	BMFP 4513 Production Planning & Control	
	BMFS 1313 Manufacturing Practices	BACS 2213 Statistics & Probabilities	BACS 2222 Numerical Methods	BMFS 2523 Manufacturing Processes II			BMFS 3373 CNC Technology		
	BMFG 1812 Introduction to Manufacturing Engineering	BMFG 1833 Mechanics of Machine	BMFS 2513 Manufacturing Processes						
Department / Course Subjects					BMFR 3143 Production Tool Design		BMFR 4143 Design For Manufacturing & Assembly	BMFR 4152 Design Case Study	26
					BMFR 3153 Computer Aided Engineering Analysis		BMFR 4133 Design Project	BMFR 4123 Rapid Manufacturing	
					BMFR 3123 Ergonomics in Design		BMFR 4173 Design for Environment		
					BMFR 3113 Engineering Graphics & CADD II				
Total	18	18	16	16	19	12	18	15	132

7.3 Bachelor of Manufacturing Engineering (Robotic & Automation)

Productivity or optimum usage of production source is among the important objectives in a manufacturing system. The usage of high-end computer and control system will help manufacturing engineers in increasing productivity. Therefore, Robotic & Automation course will give opportunities to manufacturing engineers to study automation technology such as numerical and adaptive control, industrial robot, sensor and flexible manufacturing system.

Graduates from this course have the opportunity to excel as a Manufacturing Engineers, System Integration Engineers and so on.

By Semester Subject Schedule

First Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACW 1332	Philosophy of Science & Technology	2	2	0
BACW 1412	Technical Communication I	2	1	2
BMFG 1823	Statics & Strength of Materials	3	2	3
BMFR 1113	Engineering Graphics & CADD	3	1	4
BMFS 1313	Manufacturing Practice	3	0	9
BACS 1213	Engineering Mathematics	3	2	3
BMFG 1812	Introduction to Manufacturing Engineering	2	1	2
	Total	18	9	23

First Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum I	1	0	3
BACW 1342	TITAS	2	2	0
BMFG 1833	Mechanics of Machine	3	2	3
BACS 1223	Differential Equation	3	2	3
BENG 1113	Electric & Electronic Principle	3	2	3
BITG 1113	Computer Programming	3	1	3
BACS 2213	Statistics & Probabilities	3	2	3
	Total	18	11	18

Second Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACW 1322	Malaysia Socio-Economic Development	2	2	0
BMFG 2813	Thermo-Fluid	3	2	3
BMFA 2413	Control System	3	2	3
BMFB 2213	Engineering Material	3	2	3
BACS 2222	Numerical Method	2	2	2
BMFS 2513	Manufacturing Process I	3	2	3
	Total	16	12	14

Second Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum II	1	0	3
BACW 1352	Ethnic Relation	2	2	0
BACW 2412	Technical Communication II	2	1	2
BMFA 2433	Mechatronic System	3	2	3
BMFR 2113	Product Design & Development	3	2	3
BMFP 2522	Quality & Reliability	2	1	3
BMFS 2523	Manufacturing Process II	3	2	3
BMFA 2453	Introduction To Robotic	3	2	3
	Total	19	12	20

Third Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACS 3412	Technical Communication III	2	1	2
BMFP 3513	Industrial Engineering	3	2	3
BMFP 3542	Engineering Metrology	2	1	3
BMFA 3443	Industrial Automation	3	2	3
BMFA 3453	Advance Control System	3	2	3
BMFA 3463	Microprocessor	3	2	3
BMFA 3473	Sensor & Instrumentation	3	2	3
	Total	19	12	20

Third Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 3926	Industrial Training	6		
BMFG 3946	Industrial Training Repot	6		
	Total	12		

Fourth Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 4912	Bachelor Degree Project I	2	0	6
BMFG 4812	Engineers In Society	2	2	0
BMFG 4912	Business Entrepreneurship	2	2	0
BMFS 3373	CNC Technology	3	2	3
BMFA 4423	Artificial Intelligent System	3	2	3
BMFA 4463	Computer Integrated Manufacturing	3	2	3
	Total	17	11	18

Fourth Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 4924	Bachelor Degree Project II	4	0	12
BMFP 4513	Production Planning & Control	3	2	3
BMFR 4113	CAD/CAM	3	1	4
BMFA 4473	Advance Robotic	3	2	3
BMFA 4452	Robotic Simulation & Modelling	2	2	3
	Total	15	7	25

Curriculum Schedule

Bachelor of Manufacturing Engineering (Robotic & Automation)

	First Year		Second Year		Third Year		Fourth Year		Total
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	
University Compulsory Subject	BACW 1332 Philisophy of Science & Technology	BKK* ***1 Co-Curriculum 1	BACW 1322 Malaysia Socio-Economic Development	BKK* ***1 Co-Curriculum II	BACW 3412 Technical Communication III				16
	BACW 1412 Technical Communication I	BACW 1342 Titas		BACW 1352 Ethnic Relation					
				BACW 2412 Technical Communication II					
Program Core Subject	BACS 1213 Engineering Mathematics	BACS 1223 Differential Equation	BMFG 2813 Thermo Fluid	BMFP 2522 Quality & Reliability	BMFP 3513 Industrial Engineering	BMFG 3926 Industrial Training	BMFG 4912 Bachelor Degree Project I	BMFG 4924 Bachelor Degree Project II	90
	BMFG 1823 Statics & Strength of Materials	BENG 1113 Electric & Electronic Principle	BMFB 2213 Engineering Materials	BMFA 2433 Mechatronic System	BMFP 3542 Engineering Metrology	BMFG 3946 Industrial Training Report	BMFG 4812 Engineer In Society	BMFR 4113 CAD/CAM	
	BMFR 1113 Engineering Graphics & CADD	BITG 1113 Computer Programming	BMFA 2413 Control System	BMFR 2113 Product Design & Development			BMFG 4912 Business Entrepreneurship	BMFP 4513 Production Planning & Control	
	BMFS 1313 Manufacturing Practices	BACS 2213 Statistics & Probabilities	BACS 2222 Numerical Methods	BMFS 2523 Manufacturing Processes II			BMFS 3373 CNC Technology		
	BMFG 1812 Introduction to Manufacturing Engineering	BMFG 1833 Mechanics of Machine	IBMFS 2513 Manufacturing Processes						
Department / Course Subjects				BMFA 2453 Introduction To Robotic	BMFA 3443 Industrial Automation		BMFA 4423 Artificial Intelligent System	BMFA 4473 Advance Robotic	26
					BMFA 3453 Advance Control System		BMFA 4463 Computer Integrated Manufacturing	BMFA 4452 Robotic Simulation & Modelling	
					BMFA 3463 Microprocessor				
					BMFA 3473 Sensor & Instrumentation				
Total	18	18	16	19	19	12	15	15	132

7.4 Bachelor of Manufacturing Engineering (Manufacturing Management)

The main objective of this course is to produce high caliber manufacturing engineers who understand the technological and management challenges in an industrial organization. This program stresses on operation of modern manufacturing trends such as agile manufacturing system. Manufacturing information system will become the integration factor that will ensure production is according to time, quantity, quality and cost.

Graduates from Manufacturing Management course will have a strong background in the manufacturing industry as Manufacturing Engineers, Industrial Engineers, Production Planners, Process Engineers, Quality Managers and Manufacturing Managers.

By Semester Subject Schedule

First Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACW 1332	Philosophy of Science & Technology	2	2	0
BACW 1412	Technical Communication I	2	1	2
BMFG 1823	Statics & Strength of Materials	3	2	3
BENG 1113	Electric & Electronic Principle	3	2	3
BITG 1113	Computer Programming	3	2	3
BACS 1213	Engineering Mathematics	3	2	3
BMFG 1812	Introduction to Manufacturing Engineering	2	1	2
	Total	18	12	16

First Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum I	1	0	3
BACW 1342	TITAS	2	2	0
BMFG 1833	Mechanics of Machine	3	2	3
BACS 1223	Differential Equation	3	2	3
BMFR 1113	Engineering Graphics & CADD	3	1	4
BMFS 1313	Manufacturing Practice	3	0	9
BACS 2213	Statistics & Probabilities	3	2	3
	Total	18	9	25

Second Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACW 1322	Malaysia Socio-Economic Development	2	2	0
BMFG 2813	Thermo-Fluid	3	2	3
BMFA 2413	Control System	3	2	3
BMFB 2213	Engineering Material	3	2	3
BACS 2222	Numerical Method	2	2	2
BMFS 2513	Manufacturing Process I	3	2	3
	Total	16	12	14

Second Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum II	1	0	3
BACW 1352	Ethnic Relation	2	2	0
BACW 2412	Technical Communication II	2	1	2
BMFA 2433	Mechatronic System	3	2	3
BMFR 2113	Product Design & Development	3	2	3
BMFP 2522	Quality & Reliability	2	1	3
BMFS 2523	Manufacturing Process II	3	2	3
	Total	16	10	17

Third Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACS 3412	Technical Communication III	2	1	2
BMFP 3513	Industrial Engineering	3	2	3
BMFP 3542	Engineering Metrology	2	1	3
BMFP 3523	Total Quality Management	3	2	3
BMFP3553	Ergonomic	3	2	3
BMFP 3562	Operational Research	2	1	3
BMFP 3572	Organization Behaviour	2	1	2
BMFP 3582	Manufacturing Economy	2	1	2
	Total	19	11	21

Third Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 3926	Industrial Training	6		
BMFG 3946	Industrial Training Repot	6		
	Total	12		

Fourth Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 4912	Bachelor Degree Project I	2	0	6
BMFG 4812	Engineers In Society	2	2	0
BMFG 4912	Business Entrepreneurship	2	2	0
BMFS 3373	CNC Technology	3	2	3
BMFP 4542	Project Management	2	1	3
BMFP 4563	Manufacturing Strategy	3	2	3
BMFP 4523	Lean Manufacturing	3	2	3
	Total	17	11	18

Fourth Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 4924	Bachelor Degree Project II	4	0	12
BMFP 4513	Production Planning & Control	3	2	3
BMFR 4113	CAD/CAM	3	1	4
BMFP 4533	Facilities Planning & Design	3	2	3
BMFP 4553	Modelling & Simulation	3	1	4
	Total	16	6	26

Curriculum Schedule

Bachelor of Manufacturing Engineering (Manufacturing Management)

	First Year		Second Year		Third Year		Fourth Year		Total
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	
University Compulsory Subject	BACW 1332 Philisophy of Science & Technology	BKK* ***1 Co-Curriculum I	BACW 1322 Malaysia Socio-Economic Development	BKK* ***1 Co-Curriculum II	BACW 3412 Technical Communication III				16
	BACW 1412 Technical Communication I	BACW 1342 Titas		BACW 1352 Ethnic Relation					
				BACW 2412 Technical Communication II					
Program Core Subject	BACS 1213 Engineering Mathematics	BACS 1223 Differential Equation	BMFG 2813 Thermo Fluid	BMFP 2522 Quality & Reliability	BMFP 3513 Industrial Engineering	BMFG 3926 Industrial Training	BMFG 4912 Bachelor Degree Project I	BMFG 4924 Bachelor Degree Project II	90
	BMFG 1823 Statics & Strength of Materials	BENG 1113 Electric & Electronic Principle	BMFB 2213 Engineering Materials	BMFA 2433 Mechatronic System	BMFP 3542 Engineering Metrology	BMFG 3946 Industrial Training Report	BMFG 4812 Engineer In Society	BMFR 4113 CAD/CAM	
	BMFR 1113 Engineering Graphics & CADD	BITG 1113 Computer Programming	BMFA 2413 Control System	BMFR 2113 Product Design & Development			BMFG 4912 Business Entrepreneurship	BMFP 4513 Production Planning & Control	
	BMFS 1313 Manufacturing Practices	BACS 2213 Statistics & Probabilities	BACS 2222 Numerical Methods	BMFS 2523 Manufacturing Processes II			BMFS 3373 CNC Technology		
	BMFG 1812 Introduction to Manufacturing Engineering	BMFG 1833 Mechanics of Machine	IBMFS 2513 Manufacturing Processes						
Department / Course Subjects					BMFP 3523 Total Quality Management		BMFP 4542 Project Management	BMFP 4553 Modelling & Simulation	26
					BMFP 3553 Ergonomics		BMFP 4563 Manufacturing Strategy	BMFP 4533 Facilities Planning & Design	
					BMFP 3562 Operational Research		BMFP 4523 Lean Manufacturing		
					BMFP 3572 Organizational Behaviour				
					BMFP 3582 Manufacturing Economy				
Total	18	18	16	16	19	12	17	16	132

7.5 Bachelor of Manufacturing Engineering (Engineering Materials)

In order to ensure that graduates will master the related knowledge, the syllabus and curriculum of engineering material stresses on manufacturing process aspects as a whole, material selection and material behavior in service. Laboratory for this course is equipped with high-end equipment suitable with the integration concept theoretically and practically.

Graduates from this department will have high prospect in the job market in all fields related to engineering material such as Process Engineers, Product Engineers and Quality Control Engineers. In addition, graduates have high potential in research and development field in which expertise in engineering material is highly required to develop and produce advanced materials.

By Semester Subject Schedule

First Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACW 1332	Philosophy of Science & Technology	2	2	0
BACW 1412	Technical Communication I	2	1	2
BMFG 1823	Statics & Strength of Materials	3	2	3
BENG 1113	Electric & Electronic Principle	3	2	3
BITG 1113	Computer Programming	3	2	3
BACS 1213	Engineering Mathematics	3	2	3
BMFG 1812	Introduction to Manufacturing Engineering	2	1	2
	Total	18	12	16

First Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum I	1	0	3
BACW 1342	TITAS	2	2	0
BMFG 1833	Mechanics of Machine	3	2	3
BACS 1223	Differential Equation	3	2	3
BMFR 1113	Engineering Graphics & CADD	3	1	4
BMFS 1313	Manufacturing Practice	3	0	9
BACS 2213	Statistics & Probabilities	3	2	3
	Total	18	9	25

Second Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACW 1322	Malaysia Socio-Economic Development	2	2	0
BMFG 2813	Thermo-Fluid	3	2	3
BMFA 2413	Control System	3	2	3
BMFB 2213	Engineering Material	3	2	3
BACS 2222	Numerical Method	2	2	2
BMFS 2513	Manufacturing Process I	3	2	3
	Total	16	12	14

Second Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum II	1	0	3
BACW 1352	Ethnic Relation	2	2	0
BACW 2412	Technical Communication II	2	1	2
BMFA 2433	Mechatronic System	3	2	3
BMFR 2113	Product Design & Development	3	2	3
BMFP 2522	Quality & Reliability	2	1	3
BMFS 2523	Manufacturing Process II	3	2	3
	Total	16	10	17

Third Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BACS 3412	Technical Communication III	2	1	2
BMFP 3513	Industrial Engineering	3	2	3
BMFP 3542	Engineering Metrology	2	1	3
BMFB 3243	Engineering Polymer	3	2	3
BMFB 4253	Metallurgy	3	2	3
BMFB 3263	Materials Characterization	3	2	3
BMFB 3273	Composite & Advanced Materials	3	2	3
	Total	19	12	20

Third Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 3926	Industrial Training	6		
BMFG 3946	Industrial Training Repot	6		
	Total	12		

Fourth Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 4912	Bachelor Degree Project I	2	0	6
BMFG 4812	Engineers In Society	2	2	0
BMFG 4912	Business Entrepreneurship	2	2	0
BMFS 3373	CNC Technology	3	2	3
BMFB 4253	Engineering Ceramics	3	2	3
BMFB 4263	Materials Selection	3	2	3
BMFB 4273	Semiconductor	3	2	3
	Total	18	12	15

Fourth Year - Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BMFG 4924	Bachelor Degree Project II	4	0	12
BMFP 4513	Production Planning & Control	3	2	3
BMFR 4113	CAD/CAM	3	1	4
BMFB 4212	Corrosion & Degradation	2	1	3
BMFB 4283	NDT and Failure Analysis	3	2	3
	Total	15	6	25

Curriculum Schedule

Bachelor of Manufacturing Engineering (Engineering Material)

	First Year		Second Year		Third Year		Fourth Year		Total
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	
University Compulsory Subject	BACW 1332 Philisophy of Science & Technology	BKK* ***1 Co-Curriculum I	BACW 1322 Malaysia Socio-Economic Development	BKK* ***1 Co-Curriculum II	BACW 3412 Technical Communication III				16
	BACW 1412 Technical Communication I	BACW 1342 Titas		BACW 1352 Ethnic Relation					
				BACW 2412 Technical Communication II					
Program Core Subject	BACS 1213 Engineering Mathematics	BACS 1223 Differential Equation	BMFG 2813 Thermo Fluid	BMFP 2522 Quality & Reliability	BMFP 3513 Industrial Engineering	BMFG 3926 Industrial Training	BMFG 4912 Bachelor Degree Project I	BMFG 4924 Bachelor Degree Project II	90
	BMFG 1823 Statics & Strength of Materials	BENG 1113 Electric & Electronic Principle	BMFB 2213 Engineering Materials	BMFA 2433 Mechatronic System	BMFP 3542 Engineering Metrology	BMFG 3946 Industrial Training Report	BMFG 4812 Engineer In Society	BMFR 4113 CAD/CAM	
	BMFR 1113 Engineering Graphics & CADD	BITG 1113 Computer Programming	BMFA 2413 Control System	BMFR 2113 Product Design & Development			BMFG 4912 Business Entrepreneurship	BMFP 4513 Production Planning & Control	
	BMFS 1313 Manufacturing Practices	BACS 2213 Statistics & Probabilities	BACS 2222 Numerical Methods	BMFS 2523 Manufacturing Processes II			BMFS 3373 CNC Technology		
	BMFG 1812 Introduction to Manufacturing Engineering	BMFG 1833 Mechanics of Machine	IBMFS 2513 Manufacturing Processes						
Department / Course Subjects					BMFB 3243 Engineering Polymer		BMFB 4253 Engineering Ceramics	BMFB 4212 Corrosion & Degradation	26
					BMFB 3253 Metallurgy		BMFB 4263 Materials Selection	BMFB 4283 NDT & Failure Analysis	
					BMFB 3263 Materials Characterization		BMFB 4273 Semiconductor		
					BMFB 3273 Composite & Advance Materials				
Total	18	18	16	16	19	12	18	15	132

7.6 Syllabus

7.6.1 University Compulsory Subjects

Philosophy of Science & Technology (BACW 1332)

Objectives

(a) To understand the principle and philosophy of science and technology in the Islamic civilization and a nation's development concept.
(b) To study the influence or impact of science and technology on Islamic civilization and mankind
(c) To compare concept, effects and achievements in science and technology between civilizations

Synopsis

This subject discuss the knowledge concept, science and technology philosophical concept based on the western scholars, methodology of Islamic science, concepts and achievement of Islamic civilization in mathematics, astronomy, physics, chemistry, pharmaceutical, medication, cosmology, telecommunication and current issues on science.

References

1. Ramli Awang, *Philosophy of Science & Technology*, PTS Publications & Distributors Sdn. Bhd, Kuala Lumpur, 2003.
2. Sulaiman Nordin, *Sains Menurut Perspektif Islam*, Penerbit Universiti Kebangsaan Malaysia, 1995.
3. Sulaiman Nordin, *Sains, Falsafah dan Islam*, Penerbit Universiti Kebangsaan Malaysia, 1993.

Technical Communication I (BACW 1412)

Objectives

(a) To develop students' ability to construct grammatically correct sentences in the spoken and written forms to enhance their proficiency in language skills for academic and social purposes
(b) To improve their ability to listen and comprehend various types of information in the listening input given
(c) To communicate effectively in various situations/purposes and audience
(d) To familiarize themselves with the process of writing various essay types

Synopsis

The syllabus is designed to help students improve their proficiency in English and be able to communicate effectively in the spoken and written form. The five main aspects of Grammar, Listening, Speaking, Reading and Writing are taught in an integrated approach so as to build confidence in the learners to become efficient speakers of English in their tertiary and workplace. Technical-based types of materials are utilized in classrooms so as to prepare students for greater language use.

References

1. Koh, S.L. and Tan S.L.), *Grammar Made Easy*. Prantice Hall: Kuala Lumpur, 2003.
2. Language Centre Universiti Teknologi MARA, *Vision Focus on Grammar*. McGraw Hill: Kuala Lumpur, 2003.
3. Norsiah Abu Bakar, et al., *English for Professional Communication*. Umida Industries: Johor Bahru, 2002.

Malaysia Socio-Economic Development (BACW 1322)

Objectives

(a) To give a comprehensive exposure to students on social and economic transformation process in Malaysia
(b) To give understanding to students on roles and influences of social movers on economic development
(c) To increase students' understanding on cooperation and unity among multi races community in effort to maintain stability in politic and economy

Synopsis

Discussion on the history of the formation of Malaysian society, issues on the national solidarity, Malaysian socio-economy, development policy and strategy and five year Malaysian development plan. Development plan before and after the New Economic Policy, poverty eradication, the nation's development policies, the Nation Industrialization Policies, incorporated and privatization policies, agricultural policies, urbanization policies and foreign investment policies. Globalization issues in Malaysia; concept, characteristics, processes and implication on the socio-economy development in Malaysia

References

1. Nazarudin Mohd Jali et al., *Kenegaraan Malaysia: Sejarah Awal Kemerdekaan dan Pembentukan Malaysia.* Kuala Lumpur: Kumpulan Budiman, 1996.
2. Chamhuri Siwar & Surtahman Kastin Hasan, *Ekonomi Malaysia.* Selangor: Longman, 1999.
3. Mohd Nordin Sopiee, *From Malayan Union to Singapore Seperation.* Kuala Lumpur: University Malaya Press, 1974.

Ethnics Relation (BACW 1352)

Objectives

(a) To expose students on cultural, community and ethnic plurality
(b) To give the insight of social unity in Malaysia and ethnic harmonial relation basis
(c) To increase their understanding on ethnic relation and cultural plurality challenges in Malaysia
(d) To give understanding and awareness on Islamic 'Hadhari' concept and ethnic relation
(e) To involve students on creative learning experiences on Malaysian community cultural living and social practices

Synopsis

This subject focuses on discussion about basic cultural concept and ethnic relation. It also focuses on exposing and monitoring ethnic relation development in creating a Malaysian community based on Malaysia mould and relation between regions in ASEAN. Besides that, this subject also emphasize on global challenges related to culture and ethnic relation in Malaysia and Asia. It also introduces students to ethnic relation based on Islamic perspective.

References

1. Syed Mohamad Naquib Al-Attas, *Islam dan Sejarah Kebudayaan Melayu*, Bangi: UKM, 1971.
2. D.Y.U. Wu, H. Mc Queen & Yamamoto Y. (Ed), *Emerging Pluralism in Asia and the Pacific Hong Kong*, The Chinese University of Hong Kong.
3. Abdul Aziz Bari, *Perlembagaan Malaysia: Asas-asas dan Masalah*, Kuala Lumpur: Dewan Bahasa dan Pustaka, 2000.

TITAS (Islamic Civilization and Asian Civilization) (BACW 1342)

Objectives

(a) To foster understanding and appreciation of universal values among the students
(b) To strengthen their self-authencity in their daily life practice
(c) To promote tolerance in daily life practice and appreciation of colossal civilization toward producing a civilized society

Synopsis

The subject is divided into three parts;

Part A : Civilization Knowledge

Civilization definition and its principal characteristics, the genesis and growth of civilization, interaction between civilizations. The similarities and differences between civilizations, challenges in a civilized life, civilization in the context of globalization.

Part B : Islam Civilization

Universal Islamic perspective, Islam civilization characteristics, appreciation of Islam civilization in the early environment, fostering civilization and its birth in the context of multiple culture, race and regional, evaluation system and internal institutions in Islam civilization, knowledge culture and Islam civilization. The convergence of Islam civilization with the West colonization. Islam civilization and Post-Colonial Era.

Part C : Malay Civilization

The birth of Malay civilization centers, pre-Islam heritage and the birth of universal Malay views, the growth of Bahasa Melayu and Malay literature, arts, social system and politics in Malay civilization, colonialisms challenges, western secularization, current challenges of the Malay society and Malaysian.

References

1. Hasan Kasan, Nasaruddin Yunos & Nazri Muslim (pnyt), *Tamadun Islam dan Kenegaraan Malaysia "A"*, Selangor: Pusat Pengajian Umum UKM, 2003.
2. Mohd Arip Kasmo, Mohd Sabri Haron & Abdul Salam Yusoff (pnyt), *Tamadun Islam dan Kenegaraan Malaysia "B"*, Selangor: Pusat Pengajian Umum UKM, 2003.
3. Mohd Nasir Ripin, Abdullah Sulong & Zulkiflee Haron (pnyt), *Islamic Civilization and Asian Civilization 1*, Johor: Universiti Teknologi Malaysia, 2003.

Technical Communication II (BACW 2412)

Objectives

(a) To identify the different types and formats of technical reports
(b) To read and understand a variety of texts related to technical fields
(c) To write and present the various forms of technical research report using the format and style taught

Synopsis

This course is content-based in nature and it aims to equip students with the necessary language skills required to write a technical research report. As this course prepares students for the mechanics of the different genres of report writing, the emphasis is more on writing skills, generally and report writing specifically. Apart from that, it also introduces students to the basics of presentation skills. This course is designed to prove students with necessary report writing skills in order to meet the demands of the industry

References

1. Finkelstein L.J., *Pocket Book of Technical Writing for Engineers and Scientists – Second edition*, McGraw Hill: New York, 2005.
2. Angeline R. Vijayarajoo, Ramesh Nair & Sujatha Menon. *Workplace English*. Kuala Lumpur: Pearson, 2004.
3. Ingre D., *Survivor's Guide to Technical Writing*. South-Western Thomson: New York, 2003.

Co-Curriculum I & II (BKK* ***1)

Objectives

(a) To fulfill the University volition to form a balanced and comprehensive education hence generating a more mature students
(b) To train leadership aspects stressing on disciplines and cooperation within a group or organization among students.
(c) To build personality and character guided by the rules of conduct of KUTKM
(d) To foster the zeal of cooperation and unity in a multi-racial society

Synopsis

Co-curriculum activity is a part of the academic program, compulsory for every undergraduate and diploma students. The students have to register for any kind of the activities offered and must pass the subject like any other subjects in order to be awarded a degree or a diploma.

Total credit for the co-curriculum activities agreed and approved by the senate is two (2) credits. Students are required to take one (1) credit every semester for two (2) semesters. Students are allowed to choose any subjects offered. However, they are not allowed to take the same subject for the following semester.

Technical Communication III (BACW 3412)

Objectives

(a) To communicate orally in a fluent, effective and confident manner
(b) To acquire and use the rhetoric skills in speech delivery
(c) To master skills in organizing and delivering a presentation
(d) To acquire the skills necessary in entering the job market
(e) To participate effectively in a meeting
(f) To use the correct language in speaking and writing

Synopsis

This course is designed to give value-added communication skills to equip the students with necessary communication skills in working life. It is designed to complement the skills taught in BACW 1412 and BACW 2412. These skills promote fluent oral communication in English, as well as enhancing students' level of proficiency in reading and writing skills. Grammar will also be taught implicitly. Student will also gain hands-on experience on delivering presentation, seeking employment and preparing for meetings.

References

1. Bailey, P.E., *Writing & Speaking At Work: A Practical Guide for Business Communications (2nd. Ed.).* New Jersey: Prentice Hall, 2002.
2. Delaware Technical & Community College, *Writing Skills for Technical Students. (4th ed.).* New Jersey: Prentice Hall, 2000.
3. Ingre, D., *Survivor's Guide to Technical Writing.* Singapore: Thomson Learning, 2003.

7.6.2 Program Core Subjects

Engineering Mathematics (BACS 1213)

Objective

(a) To find the function together with its domain and range
(b) To evaluate the integrals of the function with double and triple integral by using various techniques
(c) To use the technique of integration to calculate the area and the volume of the region
(d) To evaluate the vector-valued function
(e) To apply the knowledge of vector valued function in physical and engineering fields

Synopsis

This subject consists of 3 chapters: Function with some variables, multiple Integral and Vector valued function. The syllabus is developed by introducing the concepts of the functions with some variables, integration and also vector valued function, followed by learning various techniques in solving the problems and its application in physical and engineering field.

Reference

1. Halijah Osman et. Al., *Kalkulus dan Geometri Analisis Edisi 7*, Penerbit UTM.
2. Finney, Weir, Giordano, Thomas, *Calculus 10th Edition*, Addison Wesley, 2001.
3. H. Anton, *Calculus 4th Edition*, John Wiley, 1992.

Differential Equation (BACS 1223)

Objectives

(a) To solve the second order linear differential equations by using various techniques
(b) To expose student with Laplace Transform and how useful is it in the field of engineering
(c) To find Fourier series of odd functions, even functions and neither odd nor even functions
(d) To solve partial differential equations

Synopsis

This subject consists of four chapters: Second Linear Differential Equations, Laplace Transform, Fourier Series and Partial Differential Equations. The syllabus has been developed so that it can be applied in solving many engineering problems.

References

1. William E. Boyce dan Richard C. Diprima, *Elementary Differential Equations adn Boundary Value Problems 5th ed.*, John Wiley & Sons, 1992.
2. Abdul Wahid Md Raji, Hamisah Rahmat dan Mohd Nor Mohamad, *Persamaan Terbitan Biasa*, Jabatan Matematik UTM.
3. Abdul Wahid Md Raji, Hamisan Rahman dan Mohd Nor Mohamad, *Penjelmaan Leplace*, Jabatan Matematik UTM.

Electrical and Electronic Principles (BENG 1113)

Objectives

(a) To instill a strong foundation of the basic principles of electricity and electronics to enable them to follow future courses

Synopsis

Topics covered are: electrical charges, electrical force, Coulomb's law, electric field, electrostatic force, electrical quantities, Ampere's law, magnetic field, magnetic force, magnetic materials, magnetic induction, Faraday's law, Lenz's law, transformer operation, capacitor, electrical energy and power, dc and ac generators and charge movement in solid material.

References

1. Thomas L. Floyd, *Electronics Fundamentals: Circuits, Devices, and Application*, Pearson Education International, 2004.
2. Edward Hudges, *Electrical & Electronic Technology*, Prentice Hall, 2002.
3. Grob B., *Basic Electronics (8th Edition)*, McGraw Hill, 1997.

Computer Programming (BITG 1113)

Objectives

(a) To understand basic computer system and programming concept
(b) To analyze and interpret problems to find a solution
(c) To be able to use programming techniques and develop complex codes

Synopsis

In this subject, students are introduced to computer components, programming techniques and software life cycle. Concept in programming such as syntacs, semantic and execution of a program will be introduced. Problem solving methods will be discussed in depth. Concept of computer programming such as variables, types of basic data and operator will be introduced.

References

1. T.B. D'Orazio, *Programming in C++: Lessons and Applications,* International Edition, McGraw Hill, 2004.
2. J. R. Hanly, *Essential C++ for Engineers and Scientists, 2nd Edition*, Addison Wesley, 2002.
3. E. Nagler, *Learning C++ a Hands-On Approach, 3rd Edition,* Thomson, 2004.

Engineering Graphics & CADD (BMFR 1113)

Objectives

(a) To understand the basic concept in Engineering Drawing;
(b) To understand various type of projections in Engineering Drawing;
(c) To understand various types of pictorial drawings in Engineering drawing;
(d) To identify the standards and tolerances in Engineering Drawing;
(e) To produce engineering drawing which can fulfill the requirements of engineering standards
(f) To use Computer Aided Design (CAD) software such as AutoCAD to produce an accurate 2-D and 3-D engineering drawing.

Synopsis

This course is designed to enable students to apply the basic concepts of Engineering Drawing. It also exposes the learners to the application of CAD in Engineering Drawing. Therefore, the contents of the course are divided into three units that include basic engineering drawing concepts, plane geometry, solid geometry, dimensions and tolerances, related drawings and CAD drawings. The final part of this course will be the introduction to 3D solid modeling in CAD.

References

1. Mohd Fadzil Daud dan Khairul Anwar Hanafiah, Lukisan Kejuruteraan: Panduan Asas Penerbit UTM, 2000.
2. Mohd Ramzan Mainal, Badri Abdul Ghani, dan Yahya Samian Lukisan Kejuruteraan Asas Edisi ke-2 Penerbit UTM, 1988/97
3. Giesecke, Mitchell, Spencer, Hill, Dygdon, Novak Technical Drawing 12th edition, Prentice Hall, 2002

Manufacturing Practices (BMFS 1313)

Objectives

(a) To give an introduction to new students from various background concerning basic manufacturing practices and interpretation from drawings to products.

Synopsis

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

References

1. Kalpakjian S. & R. Schid, *Manufacturing Engineering and Technology, 5th Edition*, Prentice Hall, 2006
2. Kibbe, Neely, Meyer & White, *Machine Tool Practices, 5th Edition*, Prentice Hall, 1995.
3. Amstead B.H., *Manufacturing Processes, 3rd Edition*, John Wiley & Sons, 1997

Introduction To Manufacturing Engineering (BMFG 1812)

Objectives

(a) To introduce the engineering profession, manufacturing engineering and industry.

(b) To understand the resources and processes employed in the manufacturing engineering (man, money, machine and management)

(c) To introduce in the basic manufacturing and production systems, advanced technologies, and contemporary concepts of manufacturing engineering.

Synopsis

This course prepares pragmatic manufacturing engineers who will respond aggressively to the changing needs of the global marketplace, apply research and theory in the development of marketable products and efficient processes, and design with an awareness of the realities of manufacturing and the needs of society. This course gives the students an overview of the scope that deals with the manufacturing engineering. In addition, this course will deals with a basic manufacturing and production systems, advanced technologies, and contemporary concepts of manufacturing engineering

References

1. M. Haslehurst, *Manufacturing Technology*, 3rd Edition, Viva Books Private Limited, 1998
2. S. Kalpakjian, Steven R. Schmid, *Manufacturing Engineering and Technology*, 4th Edition, Prentice Hall, 2001
3. John A. Schey, *Introduction to Manufacturing Processes*, 3rd Edition, McGraw-Hill International Editions, 2000
4. Fred Waters, *Fundamentals of Manufacturing for Engineers*, Taylor and Francis, 2003

Statics & Strength of Material (BMFG 1823)

Objectives

(a) To provide students with theory and applications of engineering mechanics.
(b) To understand the basic principles of statics and strength of materials.
(c) To apply basic principles and concept to solve engineering problems.

Synopsis

Statics and strength of materials is a part of physics known as mechanics. The topics covers in this course are : forces, components, resultants, equilibrium, friction, centroids, stress and strain relationship. Cover strength of materials, the concepts of stress and strain, axial stress and deformation, thermal stress and deformation, stress concentrations, factor of safety, torsional stress and deformation, beam stresses, combined stress, riveted joints, welded joints, and Mohr's circle.

References

1. Fa-Hwa Cheng, (1997), 2th Edition, *Statics and Strength of Materials*, McGraw Hill, New York.
2. Morrow,H.W and Kokernak, R.P., (2004), 5th Edition, *Statics and Strength of Materials,* Prentice Hall, New Jersey.
3. Hibbeler, R.C., (2001), 9th Edition, *Engineering Mechanics Statics*, Prentice Hall, New Jersey.
4. Gere,J.M.,(2006), 6th Edition, *Mechanics of Materials*, Thomson Canada Limited, Canada.

Numerical Methods (BACS 2222)

Objectives

(a) To use the numerical methods to solve the problems which are unable to solve by analytical methods
(b) To analyze the error of the solutions which are obtained through numerical methods
(c) To use the computer software to solve the numerical problems

Synopsis

This subject consists of 11 chapters: Computer Representation of numbers; Error; Solution of Nonlinear Equations; Solution of Linear Systems; Interpolation; Curve Fitting; Eigen Values and Eigen Vectors; Numerical Differentiation; Numerical Integration; Solution of Differential Equations; Solution of Partial Differential Equations.

References

1. Steven C. Chapra and Raymond P. Canale, *Numerical Methods for Engineers with Programming and Software Applications, 4th ed*, McGraw Hill Book Co.
2. John H. Methews and Kurtis D. Fink, *Numerical Methods Using Matlab, 3rd Ed*, Prentice Hall Inc.
3. Bahrom B. Sanugi, *Analisis Berangka*, Penerbit Universiti Teknologi Malaysia

Mechanics of Machine (BMFG 1833)

Objectives:

(a) To understanding the basic principles of mechanics as applied in Mechanical Engineering.
(b) To understand the characteristics of the basic mechanisms which include planar linkages, cams and gearsand how to analyze their motion.
(c) To provide students with an elementary background on the design of machines elements.

Synopsis

Mechanics of Machines is designed for undergraduate courses particularly in manufacturing engineering at the faculty which covers the basic concepts of gears, gear trains, the mechanics of rigid bodies, and graphical and analytical kinematic analyses of planar mechanisms. In addition, the subject also describes a procedure for designing disc cam mechanisms, discusses graphical and analytical force analyses and balancing of planar mechanisms and illustrates common methods for the synthesis of mechanisms.

References:

1. V.Ramamurti, *Mechanics of Machines*, 2th Edition, Alpha Science International Ltd, U.K. (2005)
2. John J.Uicker, Gordon R.Pennock, Joseph E.Shigley, *Theory of Machines and Mechanisms*, 3th Edition, Oxford University Press, Inc, New York.(2003)
3. J.Hannah, R.C.Stephens *Mechanics of Machines: Elementary Theory and Examples*, 4th Edition, New Delhi. (1999).
4. G.H.Ryder, M.D Benneth, *Mechanics of Machines* , Industrial Press, New York. (1990).

Statistics & Probabilities (BACS 2213)

Objectives

(a) To understand the relationship between statistics and scientific method and how it applies to all IT and engineering disciplines
(b) To introduce students on how statistics can be used to solve real-world engineering problems
(c) To expose the students to some statistical software which can help broaden their application
(d) To be able to solve statistical problem using statistical software
(e) To be able to calculate and communicate statistical information to others

Synopsis

This subject consists of 8 chapters: Data description and Numerical Measures, Probability, Discrete Random Variables and its Probability, Distribution, Continuous Random Variables and its Probability Distribution, Sampling Distribution, Estimation, Hypothesis Testing, Simple Linear Regression and correlation and expose to a statistical software S-Plus

References

1. Douglas C. Montgomery, George C. Runger, *Applied Statistic and Probability for Engineers, 3rd edition*, John Wiley.
2. David Levine, *Applied Statistics for Engineers and Scientist*, Prentice Hall.
3. Walpole, *Probability and Statistics for Engineers and Scientist, 7th edition*, Prentice Hall.

Thermo fluids (BMFG 2813)

Objectives

(a) To identify different working fluid characteristics and able to use the physical and chemical properties in performance calculation either for the steam or gas thermodynamics system

(b) To calculate various thermodynamics properties using various forms of working fluids properties table

(c) To use the thermodynamic First Law and Second Law to calculate and design thermal systems that involved cyclic processes and system

(d) To understand the properties of fluid, principle of pressure measurement and it's mechanism and the principle of flow in pipe

Synopsis

This subject will introduce students to the basic engineering 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. Refrigeration system 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 fluid mechanics. The course covers the study of the fluid static and dynamic analysis, buoyancy and stability, Bernoulli equation, momentum principle and flow behavior in pipe. The course also covers the basic principle of dimensional analysis.

References

1. Eastop, T.D. McConkey, A., *Applied Thermodynamics For Engineering Technologist, 5th Edition*, Longman, 2004.
2. D.F. Young, B.R. Munson, T.H. Okiishi, *Fundamental Of Fluid Mechanics, 4th Edition*, John Wiley & Sons Inc, 2004.
3. Md. Razali bin Ayob, Mohd Zainal Mohd Yusof, *Termodinamik Gunaan Untuk Ahli Teknologi Kejuruteraan, 4th Edition*, Universiti Teknologi Malaysia, 1997.

Engineering Materials (BMFB 2213)

Objectives

(a) To be able to explain the basic concept of Materials Engineering in term of interatomic bonding and crystal structure.

(b) To be able to analyse different type of material behaviours so that they can relate it with the processing requirements.

(c) To be able to apply the theory related to microstructure in the phase diagram.

(d) To be able to describe how material deform or break as a function of applied load, time, temperature and another condition

Synopsis

The course is given to introduce the student to the basic concept of Materials Engineering that involved study on introduction of materials, atomic structure and interatomic bonding, the structure of crystalline solids and imperfection in the solid.

The course also covers explanation on mechanical properties of metals as well as dislocation and strengthening mechanisms. Phase diagrams study is also given to expose student to the correlation between microstructure and mechanical properties of materials. The other phase of this course is to introduce the student to the basic of application and processing of metal alloys and other nonmetal materials.

The experiments for this subject will cover specimens preparation for microscopy observation, tensile test, hardness test and microstructure study by using microscopic technique.

References

1. William D. Callister, Jr., *Materials Science And Engineering – An Introduction, 5th Ed.* John Wiley & Sons Inc., 2001 (Text Book & Tutorial Reference)
2. William F. Smith, *Principle of Materials Science & Engineering*, 3rd Ed., Mc. Graw Hill, 1996.
3. J. F. Shackelford, *Materials Science and Engineering – An Introduction,* 5th Ed., Prentice Hall, 2000.
4. W. Bolton, *Engineering Materials Technology*, 3rd Ed. BH Publisher, 2001.
5. Vernon John, *Introduction to Engineering Materials*, 4th Ed. PalGrave MacMillan, 2001.

Manufacturing Processes I (BMFS 2513)

Objectives

(a) To explain the materials and processes employed in the manufacturing engineering.

(b) To perform engineering analysis by designing and conducting experiments and analysing results.

(c) To implement technology and evaluate possibilities and limitations associated with processing.

Synopsis

This course gives the students an overview of manufacturing practices such as the design process, material selection, and process involved. The course will deal with a basic manufacturing and production systems namely material removal process, metal forming and shaping process. In material removal process, students will expose to the fundamental of lathe, drilling, milling, grinding, boring, reaming, taping and broaching. Forming and shaping process gives the students an understanding of rolling of metals, forging of metal, extrusion and drawing of metals, and sheet metal forming process. Besides of these, processing of powder metals, ceramics, glass and super conductors as well as the forming and shaping plastics and composites materials are also covered in this course.

References

1. S. Kalpakjian, S.R. Schmid, *Manufacturing Engineering and Technology, 4th Edition,* Prentice Hall, 2001.
2. Timing, R., and M. Tooley, Basic Manufacturing 2nd Edition , Newnes, 2001.
3. B.W. Niebel, A.B. Draper, R.A. Wysk, *Modern Manufacturing Process Engineering,* McGraw Hill, 1989.

Industrial Engineering (BMFP 2513)

Objectives

(a) To expose the students to basic production systems and techniques.

(b) To enable the students in designing, analyzing, implementing and controlling the integrated systems of industrial resources such as personnel, materials, equipment and information.

(c) To enable the students to improve the productivity through work measurement analysis.

Synopsis

This course covers four major elements in Industrial Engineering prospect; Production System Planning; Production Systems; Inventory, Logistic, Queuing, Forecasting, Production Operations; Facilities, Location, Layout and Material Handling; Lean Manufacturing; Work Measurement; Human Factors and Ergonomic. The elements are important for operating a production with higher productivity.

References

1. Heizer J., and Render B., *Operations Management,* 8th Edition, Prentice Hall, 2006
2. Salvendy G., Handbook of Industrial Engineering : *Technology and Operations Management,* 2nd Edition, Prentice Hall, 2001.
3. Feld William M, *Lean Manufacturing : Tools, Techniques and How To Use Them,* St. Lois Press, 2000.
4. Salvendy G., *Handbook of Human Factors and Ergonomics,* 3rd Edition, John Wiley & Sons, 2006.

Manufacruring Processes II (BMFS 2523)

Objectives

(a) To understand the materials and processes employed in the manufacturing system and engineering which related to the industry
(b) To perform engineering analysis by designing and conducting experiments and analyzing results
(c) To understand and participate in the basic manufacturing process, focuses on welding, brazing, soldering, adhesive bonding and mechanical fastening
(d) To understand the basic of metal casting process and its design consideration.

Synopsis

This course gives the students an overview of manufacturing practices such as the design process, material selection and process involves. In addition, this course will deal with the basic manufacturing and production systems, focuses on welding, brazing, soldering, adhesive bonding and mechanical fastening. Beside that, student will be briefly explained to the fundamental of metal casting process and its design consideration. Student also will be exposed to the fundamental of surface technology.

References

1. S. Kalpakjian, S.R. Schmid, *Manufacturing Engineering and Technology, 4th Edition,* Prentice Hall, 2001.
2. Society of Manufacturing Engineers, *Tool And Manufacturing Engineer's Handbook, Desk Edition*, 1989.
3. B.W. Niebel, A.B. Draper, R.A. Wysk, *Modern Manufacturing Process Engineering*, McGraw Hill, 1989.

Quality & Reliability (BMFP 2522)

Objectives

(a) To expose students to the basic concepts of Quality; Quality Assurance and Quality Control; Quality Guru's; Quality Circle.
(b) To enable students in solving the quality problems by using Statistical Quality Control (SQC) and Statistical Process Control (SPC).
(c) To expose students to the international quality systems; ISO 9000 series and product evaluation techniques; Six Sigma, Quality Function Deployment (QFD) and Design of Experiment (DOE).
(d) To introduce the principles and application of riliability.

Synopsis

Fundamental concepts of Quality and Reliability; Quality Guru's; Off line and On line quality control; Vendor quality ratings; ISO 9000 series; Quality Circles; Zero defect; Control charts; SPC techniques; Sampling methods; Statistical analysis; Factorial Design; Introduction to two levels and three level design. Failure mode and effect analysis; Reliability testing plans; Concept of Quality Function Deployment(QFD), Six Sigma, Design of Experiment(DOE).

References

1. Amiyata M. Fundamental of Quality Control and Improvement, 2nd Edition, Prentice Hall, 1998.
2. Eugene G., Richard L., Statistical Quality Control, McGraw Hill, 1998.
3. Besterfield, Dale H., Quality Control, 7th Edition, Prentice Hall, 2003.

Mechatronic System (BMFA 2433)

Objective

(a) To be able to solve and design pneumatic/electropneumatic and hydraulic/Electroydraulic system
(b) To be able to define and to control mechanical and electrical actuator using microcontroller or directly from a PC.
(c) To be able to read input from various type of sensor and integrate it into a microcontroller or a PLC.
(d) To understand how to program a microcontroller using assembly program or a higher level of programming language.
(e) To understand how to use programming to implement some of the basic control theory such as PID control.

Synopsis

In today modern world Mechatronic technologies is used in most of the machine involve in manufacturing. Earlier definition of Mechatronics is that it is the combination of Mechanical Engineering, Electrical/Electronic Engineering and Computer Engineering but later this idea is arguable. In this subject student will be expose to Fluid Power system, electrical actuator, mechanical actuator, Mechanical sensor, Light sensor, electrical sensor, software control, microcontroller control and others. Student will also be expose to integration of sensor, actuator and control to create a working system.

Reference:

1. W Bolton, Mechatronics : Electronic Control Systems in Mechanical and Electrical Engineering, Prentice Hall; 3 edition, 2004
2. Clarence W. De Silva, Mechatronics: An Integrated Approach, CRC, 2004
3. Anthony Esposito, Fluid Power with Applications, Prentice Hall; 6 edition, 2002

Control System (BMFA 2413)

Objectives

(a) To understand the basic theory of control system such as use of transfer function, linear equation, time respond and other.

(b) To be able to solve problem involving linear and time invariant system using both frequency domain and state space method and able to differentiate the differences

(c) To be able to solve problem for mechanical and electromechanical system

(d) To be able to understand and manipulate the usage of Block diagram and signal flow diagram and to be able to assesses the stability of a linear and time invariant system

(e) To be able to solve problem of steady state error and transient respond in a system using PID controller and to be able to use root locus, Bode plot, Nyquist technique

Synopsis

This subject covers the basic methods of problem solving in control system. The system includes translational mechanical system, rotational mechanical system and electromechanical system, which must be in linear and time invariant state. Student will also be expose to solve stability and steady state problem in a system. Some of the methods used in solving these problem are dynamic system modelling, Laplace transform, block diagram, Routh-Huwirtz stability, Bode and Nyquist plot, root-locus plot, and PID control (f) To be able to use MATLAB software to solve some of the above problem

References:

1. Nise, Norman S., Control system Engineering, 3rd Edition, John Wiley, 2002
2. Dorf R.C., Bishop R.H, Modern Control System, Addison Wesley, 1999
3. Palm W.J Control System Engineering, John Wiley. 2002

Product Design & Development (BMFR 2113)

Objectives:

(a) To understand the steps of product design & development.
(b) To understand the time compression technologies in order to reduce manufacturing lead time & cost.
(c) To understand the engineering aspects in product design & development process.

Synopsis

This subject enables students to broaden their knowledge in product design processes which include Product Life Cycle, Market Analysis, Methods of Developing Product Concept, Assessment of Choices, Concurrent Engineering, Rapid Prototyping, Value Analysis, Pricing, Customers Expectation and Requirements Capture, Data Collection, Engineering Product Management, Service and Marketing, Product Designs for Assembly and Manufacture, Assembly Operations, Equipments and Systems, Product Structure, Methods of Assembly Assessments.

References:

1. Karl Ulrich, *Product Design and Development.* McGraw Hill 2004
2. K.H.E Kroemer, *Ergonomics- how to design for ease & efficiency*, Pearson. 2001
3. Nigel Cross, *Engineering Design Method, Strategies for Product Design*, 3rd Edition, Open University, UK.
4. James L. Nevins, Daniel E. Whitney, *Concurrent Design of Products and Processes*, McGraw-Hill Publishing Company.

CNC Technology (BMFS 3373)

Objectives

(a) To explain the role of CNC machine tools in manufacturing systems.
(b) To impart knowledge of CNC tool path programming, tool path simulation and the linkage or interface (through DNC communication) with higher manufacturing system components such as CAPP and CAD/ CAM
(c) To program a simple to medium complexity of workpieces using milling machine, turning machine and wire- EDM.
(d) To prepare machining operations using various CNC machines (milling, turning, EDM), incorporating the selection of cutting tools, cutting parameters, jigs and fixtures, setting condition and any necessary preparatory activities.

Synopsis

The concepts of CNC machine tools, tool path programming, program verification or simulation, role of CNC machine tool within manufacturing systems. Programming and machining of parts using the various CNC machines. Factors that influence accuracy.

References

1. Seames, Warren S., *Computer Numerical Control- Concepts & Programming, 4th. Edition*, Delmar Thomson Learning, Australia, 2002.
2. Kar S., A. Gill, P. Smid, *Computer Numerical Control Simplified, 1st. Edition*, Industrial Press Ind., New York, 2001.
3. Mattson, M.., CNC *Programming: Principles and Applications,* Delmar Thomson Learning, 2002.

Engineering Metrology (BMFP 3542)

Objectives

(a) To use basic to high precision measuring equipments.
(b) To calibrate basic measuring equipments.
(c) To apply the correct measuring equipments in getting accurate and precise measurements of objects.
(d) To analyze appropriate measurement data through Statistical Process Control (SPC) method.

Synopsis

Engineering Metrology course covers three main topics; measurement analysis, dimensional metrology and surface/ texture measurement. Measurement analysis describes the standard measurement, measurement process, process capability, measurement errors, limits, tolerances and fits. In dimensional metrology, students will expose to there type of measurements; linear, angle and geometrical. Measurement of surface texture and screw thread are also covered in this course. Students will be taught how to use high precision measuring equipment such as Coordinate Measuring Machine, Digital Height Measuring Station, CNC Roundness Measuring Machine and Universal Measuring Machine.

References

1. Connie, D., Roger, H., Richard, L. T., *Fundamentals of Dimensional Metrology*, Thomson Delmar Learning, 2003.
2. Maran,.M.R., *Pengenalan Metrologi Dimensi*, Penerbit Universiti Sains Malaysia, 1998.
3. Chintakindi, S.R, Ganpule, S.S., *Metrology And Quality Control*, Technova Publishing House, 2000.
4. Kennedy, C.W, Hoffman E.G and Bond, S.D., *Inspection And Gauging*, Industrial Press Inc., New York, 1987.

Engineer in Society (BMFG 4812)

Objectives:

(a) To understand the ethical principles and engineering professionalism
(b) To understand management and financial accounting in order to become an effective and responsible engineers

Synopsis

Engineering as a career; ethics and engineering professionalism, engineering code of ethics, management theory, management process such as planning, managing, leading, controlling; management function; introduction to financial accounting

References

1. Beakley G.C & Leac H.W, *Engineering: An Introduction To A Creative Profession, 4th Edition*, Macmillan, 1997.
2. Radforf, *The Engineer and Society*, Macmillan, 1984.
3. Mohd Janib Johari, *Etika Profesional*, Penerbit Universiti Teknologi Malaysia, 2001.

Business Entrepreneurship (BMFG 4912)

Objectives

(a) To familiarize students with the environment of business competition in the frame of globalization
(b) To understand the customers' need as the basis of starting business
(c) To know the role of technology and entrepreneurship
(d) To generate business ideas
(e) To understand the role of management in entrepreneurship
(f) To understand the aspect of intellectual property rights in the business environment
(g) To know business networks and business ethics
(h) To provide inputs in preparing, developing an effective Business Plan and presenting the business plan

Synopsis

In todays' business environment, competition among firms is becoming tougher. Technology advancement is pushed by the progress of scientific knowledge and pulled by market competition through complex interrelated processes. The complexity of the business nowadays among others includes: force of globalization, rapid pace of technological change, changing on market and competition, product complexity, pressure of production cost, high cost and risk of research and development, and government regulation.

Many new businesses are grown based on new application of existing technology or a brand new technology. On the other hand many business collapses since the management does not understand the customer needs and also the role of technology.

However, innovation of new product and process open a wide opportunity for young engineers to create a new business venture. In this course, Business Entrepreneurship, will cover the knowledge about customer needs, technology, how technology can give opportunity of creating a new business venture. Understanding the concept of innovation in product and process; Leadership and the management of enterprise; strategy formulation; marketing; human resource management and intellectual property rights.

References

1. Zimmerer, Thomas W., *Essentials of Entrepreneurship and Small Business Management,* Pearson Education International, New Jersey, 2005.
2. Chell, Elizabeth, *Entrepreneurship: Globalization, Innovation Development,* Thomson Learning.
3. Kaplan, Jack M., *Getting Started in Entrepreneurship,* John Wiley and Sons Inc., New York, 2001.

CAD/CAM (BMFR 4113)

Objectives

(a) To use and familiar with CAD/ CAM software for sketching 2D elements and 3D geometric modeling.
(b) To generate machining strategies and method for tool path.
(c) To simulate the part program before the actual machining process.
(d) To transfer the NC part programming to the machine control.

Synopsis

This course is an introduction to the CAD/ CAM system and its application. The students will be exposed to the application of high- end CAD/ CAM software for generating geometric modeling and also part programming. By doing a group project, student will understand the link from CAD to CAM operation. In CAD/ CAM software also, the students will know how to simulate the part programming before start the machining operation. The part programming focused in this subject are milling and turning.

References

1. P N Rao, *CAD/CAM Principles and Applications*, McGraw Hill, 2002.
2. Lee, Kunwoo., *Principles of CAD/CAM/CAE Systems*, Addison Wesley Longman Inc., 1999.
3. McMahon, Chris., Browne, Jimmie., *CAD/CAM : Principles, Practice and Manufacturing Management, 2nd Edition*, Prentice Hall, 1998.

Production Planning & Control (BMFP 4513)

Objectives

(a) To expose students to the systems of production planning and control.
(b) To provide students with the overall production operating techniques which are used in the manufacturing industry.
(c) To enable the students to apply the production planning and control techniques at appropriate type of production.

Synopsis

This course consists of two Parts; Part I - Production Planning Systems; Demand Forecasting, Production Planning, Master Production Schedule, Material Requirements – Material Resources Planning (MRP). Part II – Production Control Systems; Production Scheduling (Job Shop, Batch, Line Flow and Assembly Line), Material Management, Inventory Control.

References

1. Stephen N. Chapman, *Fundamentals of Production Planning and Control*, Prentice Hall, 2005.
2. Godfrey C.Onwubolu, *Emerging Optimization Techniques In Production Planning and Control*, World Scientific Publishing Company, 2002.
3. Stevenson William J., *Operations Management*, 7th Edition, McGraw Hill /Irwin, 2004.

Bachelor Degree Project I & II (BMFG 4912 & BMFG 4924)

Objectives

(a) To train student working independently to design, analyze, fabricate and test any form of system or products using available facilities including library, laboratory equipment and software.

(b) To apply his/her knowledge in science, mathematics and engineering to identify and solve the problems related to manufacturing engineering.

Synopsis

Individual project will be carried out in the students' 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, written progress reports, and final written report are required. An oral presentation is required upon completion of the projects. The project is carried out over two semesters.

References

1. Buku Panduan Projek Tahun Akhir, Fakulti Kejuruteraan Pembuatan, KUTKM

7.6.3 Department/Course Subject

Department of Manufacturing Process

Production Tool Design (BMFR 3143)
(Subject offered by Department of Manufacturing Design)

Advanced Manufacturing Processes (BMFS 3323)
Objectives

(a) To introduce various advanced manufacturing processes and technologies.
(b) To expose the students towards the practical applications of non-traditional machining processes.
(c) To enable the students to differentiate and appreciate the advantageous of advanced processes.

Synopsis

The course consists of non-traditional manufacturing processes and modern material removal methods, which cover on specialized production processes using lasers, electron beam, abrasive and water jet, chemical and thermal processes. Other topics include introduction to aerospace machining, automotive stamping, coating technology and electronic manufacturing processes such as printed circuit board fabrication.

References

1. McGeough J.A., *Advanced Methods of Machining*, Chapman and Hall, 1988.
2. Degarmo, B.K., *Materials and Processes in Manufacturing, 8th Edition*, Prentice Hall, 1997.
3. Niebel B.W., A.B. Draper, R.A. Wysk, *Modern Manufacturing Processes Engineering*, McGraw Hill, 1989.
4. Groover P., *Fundamental of Modern Manufacturing Process*, Prentice Hall, 1996.

Non-Metallic Processes (BMFS 3333)

Objectives

(a) To develop an understanding of the structure property relationships of the common non-metallic materials
(b) To introduce the principles of manufacturing processes associated with non-metallic materials

Synopsis

An overview of the structure-property relationships for non-metallic materials, such as polymers, composites, ceramics and semiconductors. Consideration on the principles and steps involved in the manufacturing processes involving these materials. Important process parameters will be covered.

References

1. John A. Schey, *Introduction to Manufacturing Process*, McGraw-Hill, 2000.
2. *Modern Plastics Encyclopedia*, McGraw-Hill, 1998.
3. S.Kalpakjian, *Manufacturing Engineering and Technology, 4th Edition*, Prentice Hall, 2001.

Simulation in Production Systems (BMFS 3313)

Objectives

(a) Ability to describe production systems by means of system engineering,
(b) Overview of the field of discrete event simulation and state of the art of simulation packages.
(c) Analysis and improvement of production systems with simulation,

Synopsis

This course covers the simulation as a method to analyze and evaluate the operation or design of manufacturing processes and facilities. Students shall be enabled to efficiently use the discrete event simulation technique. Complexity is managed analyzing only relevant decision criteria. Simulation project based on real production industry situation.

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

References:

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

Industrial Automation (BMFA 3443)
(Subject offered by Department of Robotic & Automation)

Lean Manufacturing (BMFP 4523)
(Subject offered by Department of Manufacturing Management)

Project Management (BMFP 4542)
(Subject offered by Department of Manufacturing Management)

Materials Selection (BMFB 4263)
(Subject offered by Department of Engineering Materials)

Advanced CNC Machining (BMFS 4313)
Objectives

(a) To enable the students to understand the advanced CNC machining techniques with regard to the specific processes and right commands for machining optimization.
(b) To enable the students in developing complex shapes/programs for milling and turning operations.
(c) To enable the students to apply CAM software in producing complex product.

Synopsis

Designed as a follow-up to CNC Technology, this course will provide the students with advanced concepts and practices in CNC machining including milling and turning. Topics to be covered are as such as advanced computer programming of CNC milling and lathe, with regard to specific process such as drilling, tapping, boring, grooving, facing and threading. Emphasis is on programming and production of complex parts including investigation on 3, 4 and 5-axis programming techniques, utilizing canned cycles, macro's (subroutines), looping and parametric programming. The use of CAM in producing complex and efficient programming techniques also covered.

References

1. Stenerson J., Curran K., *Computer Numerical Control: Operation and Programming, 3rd Edition*, Prentice Hall, 2007.
2. Smid P., *CNC Programming Handbook, 2nd Edition*, Industrial Press Inc., 2003.
3. Robert Q., *Computer Numerical Control: Machining Turning Centers, 2nd Edition*, Prentice Hall, 2005.

Ergonomics in Design (BMFR 3123)

Objectives

(a) To increase awareness and the role of ergonomic and occupational health in manufacturing design.
(b) To obtain basic knowledge in the application of ergonomic principles to design of industrial workplaces and the prevention of occupational injuries.
(c) To understand the breadth and scope of occupational ergonomics from the aspect of designing.
(d) To analysis and design for ergonomic product features.

Synopsis

This course is an introduction to the basic principles and methods of ergonomic and occupational health in manufacturing design. The students will be exposed on the application of knowledge about human capabilities and limitations to the design of workplaces, work methods and jobs for optimal safety, efficiency, productivity and comfort. These topics include: systems design and task analysis, muscle use and anthropometrics, workspace design, activity-related soft tissue disorders, back injuries, shift work, organizational and psychosocial aspects of work, skilled work and mental activity and regulations in ergonomics. The students also will be using CAD tooling components software as training equipment, make analysis and presentation of ergonomic product features. Final project for ergonomic in designs subjected to student presentation and evaluation.

References:

1. Bridger R.S., *Introduction to Ergonomic*, McGraw Hill, 1995.
2. Alphonse Chapanis., *Human Factors in System Engineering*, John Wiley, 1995.
3. PN Rao, *CAD/CAM Principles and Applications*, McGraw Hill, 2002.

Computer Aided Engineering Analysis (BMFR 3153)

Objectives:

(a) To provide students with an understanding of how modern CAE Analysis tools are used.
(b) To analyze mould design for plastic products and tool & die design for stamping process.

Synopsis:

This course aims to give students an introduction to CAE to enable them to tackle a range of problems using Finite Element Analysis (FEA). An introduction to numerical techniques is provided, the use of softwares is developed and critical appraisal of results will be emphasized. The 'hands on' approach with computer based workshops will be done with CAE tools such as Solidworks/Cosmos, Catia, Matlab & Simulink.

References:

1. Nicholson D. W. , Finite Element Analysis : Thermo Mechanics of Solids, Boca Raton, CRC Press , 2003
2. Cook R D. *Finite Element Modeling For Stress Analysis*. John Wiley & Sons, 1995
3. Babuska I., *The Finite Element Method And Its Reliability* , Oxford Press, 2001
4. Hyochoong C. , Young W. , *The Finite Element Method Using MATLAB* , Boca Raton, CRC Press , 2002

Engineering Graphics & CADD II (BMFR 3113)

Objectives

(a) To enhance students capability to design in 3-Dimension

(b) To familiarise students with the application of simulation and engineering analysis tools at early stages of the design

Synopsis

This subject is an advancement of Engineering Graphic I, which the students will broaden their basic knowledge in 3D parametric modeling application. The purpose of this course is to provide students with an understanding of three dimensional modeling and application of simulation tools in determining the validity of the design before prototyping. Emphasis is placed on 3D modeling generation skills which can be represented the actual design of an actual parts. Analysis parameters, Material selections and Test Constraints can be simulated at early stages of the design.

References

1. Ulrich K., *Product Design and Development.* McGraw Hill, 2004.
2. Otto K., *Product Design*, Prentice Hall, 2001.
3. Hyman B., *Fundamentals of Engineering Design, Second Edition*, Prentice Hall, 2003.

Production Tool Design (BMFR 3143)

Objectives

(a) To expose the students to the basic principles and methods of jigs and fixtures design, joining, die design and N/C tooling.

(b) To familiarise the students with the use of CAD tooling components software.

Synopsis

This course is an introduction to the basic principles and methods of jigs and fixtures design, joining, die design and N/C tooling. The students will be exposed to the application of graphics to industrial work holding devices; their application, drawing and design. Construction of working drawings aided by standards, company catalogs and handbooks. The subject will also introduce the locating elements; clamping elements, tool guiding and setting elements. The students will use CAD software as the hands-on approach to the course.

References

1. *Fundamental of Tool Design, 5th Edition.* Society of Manufacturing Engineers, 2003.
2. Hoffman, Edward G., *Jig & Fixture Design*, 5th Edition, Delmar Publisher, 2002.
3. Joshi, P.H., *Jigs and Fixtures Design Manual, 2nd Edition,* McGraw-Hill, 2003.

Design for Manufacture & Assembly (BMFR 4143)

Objectives

(a) To enhance the knowledge on the principles and application of product design and manufacturing/assembly processes.

Synopsis

Introduction to design for manufacture and assembly, material selection and work planning process, systematic method design for assembly, design rules, factors influence product design, case studies and projects.

References

1. Tulkoff J., *CAPP From Design to Production*, SME, 1988.
2. Boothroyd G. et. al., *Product Design for Manufacture & Assembly (2nd Revised & Expanded)*, Marcel Dekker, 2001.
3. Kamrani and Salehieh, *Product Design for Modularity*, Kluwer Academic Publishing, 2000.

Rapid Manufacturing (BMFR 4123)

Objectives:

(a) To understand and perform various types of rapid prototyping technologies such as selective laser sintering, stereo lithography, etc.
(b) To select the best rapid prototyping technology for a particular design or part.
(c) To understand the process and perform rapid tooling activities.
(d) To understand and perform reverse engineering activities using reverse engineering equipment for rapid reproduction and design alteration.

Synopsis

Product development almost always requires the building and testing of prototypes. A prototype is an approximation of the product on one or more dimensions of interest. Prototypes are used for learning, communication, integration and milestones. The course will provide a study of different prototyping methodologies and technologies.

References:

1. Wright P. K., *21st Century Manufacturing*, Prentice Hall, 2001.
2. Jacobs P. F , *Stereolithography and other RP technologies*: From rapid prototyping to rapid tooling, Dearborn,MI: Society of Manufacturing Engineers in cooperation with the Rapid Prototyping Association of SME, 1996
3. Niebel B.W., Draper A.B., Wysk R.A., *Modern Manufacturing Process Engineering*, Mc Graw Hill, 1989

Design Case Studies (BMFR 4152)

Objectives

(a) To integrate the knowledge of design for manufacturing and assembly principles gained through-out the course in the critical analysis of available designs.

(b) To develop the ability of students to propose alternative design, taking into account factors such as the enviroment, society and the emergence of new technologies.

Synopsis

This course will use case studies as an interactive learning strategy, shifting the emphasis from teacher-centered to more student-centered activities. Case studies are used to expose students to real-world issues with which they may face and to increase the interest & motivation of students on design. It allow the application of theoretical concepts to be demonstrated, thus bridging the gap between theory and practice, and encourage active learning. The course will provide an opportunity for the development of key skills such as communication, group working and problem solving. It also increases the students' enjoyment of the topic and hence their desire to learn. Student will get a chance to actually apply what they're learning.

References

1. Walker D. J., *Creative techniques in product and engineering design* :A practical workbook, 1991
3. Ulrich K., *Product Design and Development*, McGraw Hill,2004.
4. Dominick P. G., *Tools and tactics of design*, Wiley ,2001.

Design Project (BMFR 4133)

Objectives

(a) To enable students to analyse and synthesise engineering applications in specific fields.
(b) To develop skills and usage of specialised techniques in the application of graphics as a communication tool.
(c) To encourage students to work individually and in teams to solve specific engineering problems.
(d) To develop skills in research and problem-solving related to engineering and manufacturing design.

Synopsis

This subject develops the student's competence and self-confidence as designers. Design projects are drawn from problems in all areas of manufacturing engineering. Some of the problems are based on real industry problems and the rest are provided by the department faculty. The aim of these projects is to provide students with the opportunity to work in greater depth on the Embodiment Phase of the design process and to use advanced computer-based tools to analyse and to optimise the result and the design. Projects must incorporate engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social and political.

References

1. Walker D. J., *Creative techniques in product and engineering design* :A practical workbook, 1991
2. Matthews C., *Case studies in engineering design* , London: Arnold, 1998
3. Ulrich K., *Product Design and Development*, McGraw Hill,2004.
4. Dominick P. G., *Tools and tactics of design*, Wiley ,2001.
5. Yousef Haik, *Engineering design process*, Thomson/Brooks/Cole, 2003.

Design for Environment (BMFR 4173)

Objectives

(a) To identify and understand the economical and strategic business reasons for reducing the impacts of products and manufacturing processes on the environment at local, national and global levels

(b) To analyze the advantages and disadvantages of sustainable methods of designing, manufacturing, marketing, disposal and recovery of products and take advantage of eco-product design and clean manufacturing technologies in eco-product design and manufacturing process.

(c) To articulate and manage the necessary paradigm shift in the design of new products and processes and the steer company/organization towards sustainable product design, development and business operations.

(d) To select suitable design tools and techniques for environmental friendly products and processes and be able to apply them in environmental planning, management and decision making.

(e) To devise strategies for eco-products and clean processes to prevent environmental costs and improve competitiveness and environmental performance of the company / organization

Synopsis

The aim of this course is to train a new generation of product designers and profesionals who will play a major role in the move towards sustainable development. They need to integrate the needs of the customer with those of the environment to ensure that the society can reach a more balanced trade-off between economy and environment. New eco-friendly products and clean manufacturing technologies need to be developed and utilized in our drive towards sustainable development at national and global level.

References:

1. M.S. Hundal, *Mechanical life Cycle Handbook*, Marcel Decker Inc, 2002.
2. H. Lewis & J. Gertsakis, *Design + Environment*, Greenleaf, 2001.
3. D. Mackenzie, *Green Design, Design for the Environment*, Laurence King ltd, 1991.

Department of Robotic & Automation

Introduction to Robotics (BMFA 2453)

Objectives

(a) To familiarise students with the elementary background needed for robot application.
(b) To enable students to apply the basic principles underlying the design, analysis and synthesis into the robotic systems.

Synopsis

This subject covers a range of topics on kinematics, dynamics, sensors, robot control systems and robot programming. The emphasis is also given on the physical meaning of basic concepts and the mathematical principles in order to enhance the students understanding of robot concepts in term of analysis, design and synthesis.

References

1. Man Zhihong, *ROBOTICS For Computer Engineering Students*, Pearson Prentice Hall, 2004.
2. Craig J. J., *Introduction to Robotics Mechanics and Control*, Pearson Prentice Hall, 2005.

Advanced Control System (BMFA 3453)

Objectives

(a) To be able to design a control system using Root locus, Frequency respond and state space.
(b) To understand the theory and solve problems in control system with Non-linear, time variant and digital control.
(c) To be able to use MATLAB to solve some of the above problems.

Synopsis

This subject is the continuation of the control system subject. It covers the solution methods for non-linear and time variant system, where the determination methods of the system stability learned in control system subject cannot be used anymore. Instead, the methods that will be used are qualitative analysis of non-linear systems; non-linear controllability and observability; non-linear stability; feedback stabilization and linearization. Students will also be exposed to digital control system using z-transform and its solution methods.

References:

1. Nise N. S., Control system Engineering, 3rd Edition, John Wiley, 2002
2. Ogata K., Discrete Time Control System, Prentice Hall, 2000.
3. Fett G. H., Feedback and Control Systems, Prentice-Hall Electrical Engineering Series, 2001.

Sensors & Instrumentation (BMFA 3473)

Objectives

(a) To be able to identify different types of measurement techniques used.
(b) To be able to solve problems related to some of various types of instrumentation systems.
(c) To be able to identify and specify different type of sensor and it application in a system.
(d) To understand how to read data from different types of sensors and display the data in a form understood by human users.

Synopsis

This subject will cover sensor and instrumentation technologies in a system. Instruments and its method of measurement is the main area discusses and expose to student. Different technologies are usually used in industry which includes mechanical or physical measurement, electrical measurement, fluid measurement and other. Each different type of measurement needs different type of sensor and signal conditioning system which is also cover in this subject.

References:

1. Dunn W. C., *Introduction to Instrumentation, Sensors, And Process Control*, Artech House Publishers; 2005
2. Johnson C. D., *Process Control Instrumentation Technology, 7th Edition*, 2003
3. Webster J.G., *The Measurement, Instrumentation and Sensors Handbook*, CRC, 1998

Microprocessor (BENG 3113)

Objectives

(a) To be able to understand the fundamental knowledge of microprocessor system
(b) To have sufficient background to enter advanced studies in programming microprocessor and microcontrollers.

Synopsis

This subject will provide the students both a solid theoretical and a practical introduction to the microprocessors and support devices used to create the extensive array of microprocessor-based devices found in consumer and industrial electronics today. Inside the microprocessor, registers, accumulator, program counter, microprocessor instruction, input/output, polling, interrupt and PIC microcontroller.

References:

1. Ramesh S. Goankar, *Microprocessor Architecture, Programming and Applications with 8085, 4th Edition*, Prentice Hall, 1999.
2. Charles M. Gilmore, *Microprocessors: Principles and Applications*, McGraw Hill, 1995.
3. Alan Clements, *Microprocessor Systems Design, 68000 Hardware, Software and Interfacing*, PWS Publication Co., 1997.

Industrial Automation (BMFA 3443)

Objectives

(a) To understand and design systems related to material handling in automation system.
(b) To be able to program PLC using at least ladder diagram method and to be able to solve problems in automation using logic control and logic diagram.
(c) To be able to understand and identified some of the Industrial type robot.

Synopsis

This subject will expose the students to automation technologies, such as material transfer system, data transfer, ASRS (automated storage and retrieval system), design of automated manufacturing system and PLC programming. Student will also be expose to interrelation between automation system and manufacturing system which drive today manufacturing world.

References:

1. Groover M. P., *Automation, Production Systems, and Computer-Integrated Manufacturing, 2 Edition*, Prentice Hall; 2000.
2. Asfahl C. R., *Robots and Manufacturing Automation*, Wiley, 2nd Edition, 1992.
3. Shell R., *Handbook of Industrial Automation*, CRC, 2000.

Robotic Simulation & Modeling (BMFA 4452)

Objective

(a) To be able to use robot simulation software to design and simulate robot kinematics movement
(b) To be able to program robot movement in the robot simulation software and transfer that program into an actual robot.
(c) To be able to design tool or specialize JIG and attach it to a robot in the simulation software
(d) To be able to design a moving conveyor and integrate a robot to pick a workpiece on the moving conveyor.

Synopsis

Student will be exposed to robot simulation and modeling software such as I-Grip, Workspace, Fanuc roboguide, ABB Robotstudio and others. These software include industrial robot programming, robot kinematics design, robot tool design, design of Jig and Fixture and robot simulation. The robot programming created in this software can also be transfered to an actual robot and move as simulated in the software.

References

1. Borangiu T., Ionescu F., *Robot Modelling & Simulation*, Editura Academiei Romane, 2002.
2. *Workspace 5, PC Based Robotic Software User Manual*, 2003.
3. Spong W. M., Hutchinson S., Vidyasagar M., *Robot Modeling and Control*, Wiley, 2005.

Artificial Intelligent Systems (BMFA 4423)

Objectives

(a) To gain basic knowledge on the fundamental of Artificial Intelligence (AI) components such as Knowledge-Based System (KBS), Expert System (ES), Artificial Neural Network (ANN), Genetic Algorithm (GA), Fuzzy Logic (FL) and their combinations (hybrid systems) to solve problems within manufacturing domain.

(b) To program and/or to use one and more of the tools for performing or composing intelligent tasks/ functions within a manufacturing system.

(c) To have some basic understanding/knowledge for designing, analysis, developing and synthesis of a system for manufacturing from AI point of view.

(d) To understand the usage of AI in manufacturing for integration, automation, optimization, analysis and synthesis of the system.

Synopsis

Intelligent Manufacturing System introduces students to the theory of Artificial Intelligent to build, to analyze, to synthesise intelligent components of manufacturing system. The course put forword the theoretical background of AI components such as Knowledge-Based System, Expert System, Artificial Neural Network, Fuzzy Logic and Genetic Algorithm. Then, the students will be introduced to the implementation into manufacturing systems. Several manufacturing case studies are presented to fulfill the subject requirements. The studies are not only limited to manufacturing processes, robotics, automation and/or design manufacturing, it will also introduce to the machine learning, vision systems, etc., where the topics are related and appropriate to manufacturing science.

References

1. Negnevitsky M., *Artificial Intelligence (A Guide to Intelligent Systems), 2nd Edition*, Addison Wesley, 2005.
2. Bratko I., *PROLOG: Programming for Aritificial Intelligence, 3rd Edition*, Addison Wesley, 2001.

Computer Integrated Manufacturing - CIM (BMFA 4463)

Objectives

a) To be able to integrate a CIM system into a working automated system.
b) To be able to use PLC to control a single station or multi station of an automation system.
c) To understand and able to use a SCADA or an ERP software in a CIM system.

Synopsis

Student will be exposed to the integrating methods of manufacturing system to a fully automated system. The topic covered in lectures are supported by the lab works that the students will carry out. This includes the integration of CNC machines, robots, automated transfer system, PLC, sensor system, machine vision system and so on. In this subject, the students need to integrate the system themselves in the projects that will be given.

References:

1. Bedworth D.D., Henderson M.R. and Wolfe P.M., *Computer Integrated Manufacturing* 2nd edition, McGraw-Hill, 1991
2. Groover M.P., Automation, *Production Systems and Computer Integrated Manufacturing* 2nd Edition, 2001
3. User manual from CIM equipment in the lab and related journal in CIM system.

Advanced Robotic (BMFA 4473)

Objectives

a) To have a wider idea or vision on the advances in robotic technologies affecting specifically manufacturing sector and the world as a whole.
b) To be able to identify some of the other types of robot technologies beside industrial type robot such as mobile, and service robot and it application in manufacturing sector.
c) To be able to understand the effect of Intelligence System to robot design and its improvement to the robotic world.

Synopsis

This subject will expose student to robot technologies other than industrial type of robot such as Mobile Robot, Service Robot, Interactive Robot, Haptic Control Robot and others. The differences in the applications between industrial type of robot and the robot mention above will be highlighted. Control system, Sensor technologies, Design concept, mechanical design technologies, actuator used are some of the topic touch in this subject. This subject is intended to give student opportunity to open their ideas toward how robotic technologies in the future can effect manufacturing specifically and the human world at large.

Reference:

1. Jones J.L., *Mobile Robots. Inspiration to Implementation, 2nd Edition*, A.K Peters Ltd, 2003
2. Yuta S., Asama H., *Field and Service Robotics : Recent Advances in Research and Applications*, Springer, 2006.
3. Lenarc J., Stanisic M.M., *Advances in Robot Kinematics, 1st Edition*, Springer, 2006

Department of Engineering Material

Metallurgy (BMFB 3253)

Objectives

(a) To give an introduction to the principle of physical metallurgy, crystal structure and non-metal alloy properties.
(b) To give an introduction to the solidification process, plastic deformation and strengthening mechanism.
(c) Students should understand the principle of recovery process, recrystallization and grain growth.
(d) To understand the usage of Fe-Fe$_3$C diagram, TTT diagram and etc.
(e) To give basic introduction on non-ferrous metal and metal alloys.
(f) To understand and to utilize all the elasticity theory on the metal work and mechanical tests related to metals.

Synopsis

Exposure on physical metallurgy that will be covered includes crystal structure and non metal alloys, solidifications, plastic deformation, strengthening mechanism, solid solution hardening, deformation hardening, deposition hardening, array non array hardening, recovery, recrystalization and grain growth. Fe-Fe$_3$C diagram. TTT diagram. Hardenability. Heat treatment for steels. Non-ferrous metals and alloys. Metal and alloys for low and high temperatures applications. Cast iron.

The mechanical metallurgy part of the subject will involve elasticity behaviour, elasticity theory: stress and true strain, yield criteria, stress combination test: relationship between stress-strain with plasticity. Mechanical works for metals; temperatures effects on the strain rate to the stress flow. Metallurgical structure. Friction and lubrications, mechanical tests for metal in tensile, tork, hardness, creep, impact.

References

1. William D. Callister, Jr., *Materials Science And Engineering – An Introduction, 5th Ed.* John Wiley & Sons Inc., 2001
2. William F. Smith, *Principle of Materials Science & Engineering*, 3rd Ed., Mc. Graw Hill, 1996.
3. Robert E, Reed-Hill and R. Abbaschian, PWS-Kent *Physical Metallurgy Principles*, 1992.
4. R.W. Hertzberg, *Deformation and Fracture Mechanics of Engineering Materials, 4th Ed.*, Wiley (1996)

Composites & Advanced Material (BMFB 3273)

Objectives:

(a) To expose students to the definition of matrix materials & the reinforcement and also types of composite (PMC, MMC or CMC) and composite characteristics.

(b) To give an understanding about the techniques & processes involved in producing various types of composite.

(c) To introduce to the students about the testing techniques for Composite Material Engineering.

Synopsis

Composite Material: The several numbers of composite type, matrix and reinforcement. Characteristic of manufacturing methods and reinforcement mechanism, failure mechanism, design and application related to the composite.

Introduction to the development of advanced material and the applications. Ceramic Engineering Material for heat engine, electronic, automatic, biomedical & etc, synthetic metal materials & alloys production for high temperature uses, nano material, bio material, photonic material, optoelectronic material and intelligent material.

Advanced Processing involved all types of material development of alloy, super alloy, and advanced alloy with Ti, Ni, and Al-Li basis. The manufacturing and the application. Intermediate metal material.

OBE concept that going to be used for this subjects will be consist of paperwork assignments and case study presentation.

References

1. Mathew F.L., Rawlings R.D., *Composite Materials: Engineering & Science*, Chapman & Hall, 1998.
2. Ronald F.G., *Principles of Composite Material Mechanic*, Mc Graw Hill, 1994.
3. El-Eskandarany S.M., *Mechanical Alloying for Fabrication of Advanced Engineering Materials*, Noyes Publication, 2001.
4. Edelstein A., Cammarata R.S (Ed)., *Nanomaterial: Synthesis, properties and applications*, 1996.

Material Characterization (BMFB 3263)

Objectives

(a) To understand, explain and run various types of materials characterizations techniques.
(b) To analyse all the results obtained from x-ray analysis, thermal analysis, TEM, SEM, FTIR.
(c) To develop skills to operate the particular machines and tools for the engineering materials characterizations purposes.

Synopsis

Theoretical background and operational principles for the optical microscopy and the scanning electron microscope (SEM). Samples preparation and 'hands on' equipments handling. Exposure on methods of analysis for experimental results

Crystallography principal and the chemistry of crystals. Characterization of crystal materials by using x-ray diffraction techniques. Sample preparations methods, the mechanism of machines operation and the analysis of diffraction peak. Exposure on substances observation, measurements of lattices parameter by using x-ray fluorescent technique (XRF). Introduction on the internal texture of metals, polar figures, texture development and materials properties. Samples preparations for spectrum analysis, interference and also several examples of applications.

Spectrometry Methods: Principle, common techniques for materials research study – UV-VIS, atomic absorption spectrometry. Light absorption theory – absorbents, delivery and Beer Law. Atomic absorption technique, lighting, pendarflour, techniques and the usage of atomic absorption spectrometry technique, equipments parameter optimisation and examples of applications

Thermal analysis by using DTA, DSC, DMTA and other types of thermal analysis techniques that commonly practises in industry.

References

1. B. D. Cullity and S.R. Stock, *Elements of X-ray Diffraction*, Prentice Hall, New Jersey, 2001.
2. Budinski, KG. Budinski, M.K., *Engineering Materials: Properties and Selection, 6th Edition*, Prentice Hall, 1999.
3. Holman J. P. , *Experimental Methods for Scientists and Engineers, 7th Edition*, McGraw Hill, 2001.
4. Callister W. D. , Jr., *Materials Science And Engineering – An Introduction, 5th Edition*, John Wiley & Sons Inc., 2001.

Engineering Polymers (BMFB 3243)

Objectives

(a) To explain the fundamental principles of polymer engineering..
(b) To expose students to the classfication of engineering polymer ; thermoset, thermoplastic dan elastomer.
(c) To explain the inter relationship between polymer properties, structures and application.
(d) To describe and explain the different polymer processing techniques to become end-product.

Syllabus

Introduction to polymer engineering, classification of polymer engineering, properties of polymer engineering, concept of composites and blends based on polymer and overview of polymer processing. Laboratory for this subject involves the application of extruder, internal mixer, injection molding, mechanical testing and observation of structure under microscope.

References

1. Kumar, A. 2003.Fundamental of Polymer Engineering.
2. Crawford, R.J. 1998. Plastic Engineering. Butterworth Heinemann.
3. Powell, P.C. 1999. Engineering with Polymers. Chapman & Hall.
4. McCrum, N.G. 1997. Principles of Polymer Engineering

Engineering Ceramics (BMFB 4253)

Objectives

(a) To expose students to the classfication of engineering ceramic ; properties and the important of application ceramic in industries .
(b) To understand the preparation of raw materials with specific process.
(c) To be able to identify forming process: palstic method, pressing method, slip casting, drying dan firing.
(d) To be able to understand the relationships between the processing and the theories : sintering mechanism, ceramic microstructure etc.

Syllabus

This course comprises of two parts : Fundamental of ceramic engineering whereby includes classification of ceramic, properties and the material characterization. Second part will explain about preparation process of ceramic. The practical work consists of slip casting, powder-forming process, testing of glass properties, and microscopy analysis.

References

1. King A.G, *Ceramic Technology and Processing*, 2002.
2. Munz, D., *Ceramic : Mechanical Properties and Failure*, 1999.
3. Reed, J., *Principles of Ceramics Processing, 2nd Edition*, John Wiley & Sons, New York, 1995.
4. Borsoum, M., *Fundamentals of Ceramics, 1st Edition*, McGraw Hill, New York, 1997.
5. Chiang, Y-M. D. Birnie and W.D. Kingery, *Physical Ceramics: Principles For Ceramic Science and Engineering*., John Wiley & Sons, New York, 1997.

Corrosion & Degradation (BMFB 4212)

Objectives

(a) To expose student to the different corrosion types and mechanism as example chemical corrosion and electrochemical corrosion.
(b) To expose student to the thermodynamic principles associated with corrosion and corrosion kinetic.
(c) To understand the principles of corrosion tests and corrosion control.
(d) To introduce the surface engineering that involve on wear and friction.
(e) To expose about degradation process on non-metal materials.

Synopsis

Corrosion definitions, important of corrosion and types of corrosion, basic electrochemical mechanism and electrochemical degradation theory. Thermodynamics on corrosion cell, corrosion behaviour and electrode potential. Pourbaix diagram. Electrode kinetic and electrochemical corrosion kinetic, corrosion rate, polarization, single electrode theory, double electrode theory, potential mix potential, localize corrosion, corrosion interaction and mechanical force.

Introduction to the surface engineering: Tribology, friction, wear and corrosion. Surface engineering process: mechanical treatment, shot peening, grain blasting.

Protection – corrosion – electrochemical, coating, inhibitor, thermal hardening, metallurgical, electro deposition, chemical vapour deposition, solid vapour deposition, blasting, welding, anodising, vaporization process, sputtering process, design and materials selections.

Degradation – polymer materials, cement and concrete, glass

References

1. Wranglen, *Introduction to Corrosion and Protection of Metals*, Chapman & Hall, London, 1985.
2. Fontana, M.G. & Green N.D., *Corrosion Engineering. 3rd Edition*, McGraw Hill, New York, 1986.

Materials Selection (BMFB 4263)

Objectives

(a) To expose students to the concept underlying material selection including the process limitation in designing engineering materials.
(b) To expose students to the engineering approach in selecting the processes and materials.
(c) To inculcate the ability to apply various guideline materials for designing engineering materials such as the use of Ashby diagram among students.
(d) To instill to the students the ability to choose the right materials to be used in fabricating products for commercialization.

Synopsis

Introduction to the material selection process, classification of engineering materials (metals, ceramics, polymers and composites), requirements in selecting materials (service requirement, economy and fabrication).

Process design, introduction to the factors that influence a design, designing code, design judgment probability, judgment capability, design characteristics (function, design, production method, cost). Design philosophy, cost based comparative value analysis, material property value analysis. General methodology in designing and selecting related materials. Factors involved in material selection: interrelated limitations, physical factors, mechanical factors, processibility, factor of component lifetime, cost, readability and other basic criteria.

Elasticity, crack resistance and impact strength aspects of the design. Selection for purposes (strength, fatigue resistance, heat resistance, wear resistance and corrosion resistance) Selection by normal rules, semi-quantitative selection method, examples of selection in some case studies.

Students will be assigned with an engineering component design project that will require them to utilize the theory of material selection. A computer sofrware package regarding material selection will also be introduced to students. Students will be required to identify the appropriate materials to be used in their project and to explain the reasons behind the selection.

References

1. Cranes, F.A.A & Charles, J.A., *Selection and use of Engineering Materials*, Butterworths, London, 1984.
2. Mahmoud M. Farag, *Selection of Materials and Manufacturing Processes for Engineering Design*, Prentice Hall, 1989.

Semiconductor Materials(BMFB 4273)

Objectives

(a) To introduce students to the basic structures available in semiconductor materials such as p-n junction, metal-semiconductor junction, diode etc.

(b) To provide students with an understanding of the concept of energy bands in both the intrinsic and extrinsic semiconductor materials.

(c) To provide students with an understanding of the carrier transport phenomena, Hall effect and carrier generation and recombination in semiconductor materials.

(d) To expose students to the processes needed in fabrication of integrated circuit (IC) such as single-crystal growth, doping and wafer fabrication.

Synopsis

Energy band theory: charge carriers, field intensity, potential energy barrier, atom characteristics, Brillouin zone and atomic energy levels, electronic structure of the group IVA elements, energy band of crystals and valence model for intrinsic and extrinsic semiconductor.

Transportation phenomena in semiconductor, conductivity, charge density in extrinsisc semiconductor in equilibrium, Hall effect, charges generation and recombination, Boltzmann equation.

Quantum transportation, semiconductor tunneling, AC conduction, optical properties of semiconductor.

Exposure to semiconductor fabrication technology, substrate preparation, fabrication technique, amorphous semiconductor, organic semiconductor.

References

1. Yu, *Fundamentals of semiconductors-physics*, P.Y. 2001
2. Anderson, *Fundamentals of semiconductor devices* , B. L. 2005
3. Donals, A. N., *Semiconductor Physics and Devices -Basic Principles.*McGraw Hill, 2003
4. *Handbook on Semiconductors*: Vol. 2, 3 & 4. Amsterdam: North-Holland, 1983.
5. *Preparation and Economical Wafering Methods.* Park Ridge, New Jersey: Moyes Pub., 1984.

NDT and Failure Analysis (BMFB 4283)

Objectives

(a) To give an exposure about defects that always occurs to the materials during processing and services
(b) To give an exposure about characterization technique and failure detection such as ultrasonic, electromagnetic, eddy current and others.
(c) To apply knowledge on failure investigation techniques and exposure on several case study.

Synopsis

principles of failure mechanisms in engineering materials. Liquid penetration: Introduction, principle, surface preparation, method of handling, burr rejection, expansion, view and examination. Liquid penetration property, washable water system, post-emulsification system, solvents elimination systems, washing, advantage and limitation.

Magnetic atom technique: Introduction, magnetization, magnetization technique, sensitivity, demagnetisation, magnetization particle, advantage and limit.

Electric testing method (centrifugal current testing): Introduction, principle, centrifugal current testing, materials conductivity, magnetic property, impedance coil, skin effect, examination frequency, coil arrangement, examination probes, circuit types, resonant types, signal phase analysis, expose method.

Ultrasonic testing: Introduction, radiography utility, radiography limit, radiography principle, emission source, x-ray emission, x-ray spectrum, gamma emission sources, attenuation emission, shadow formation, amplification formation and distortion, radiography film and paper, radiography xero, fluoroscopy, exposure factor, radiography screen, sign identification and quality icon legend, basic shape examination, interpret, emission hazard, protection from emission, emission measurement, measurement on emission accept by individual.

Other non-destructive technique: optical examination probes, neutron radiography, induced ultrasonic laser, acoustic output examination, crack depth gauge, thermograph, texture surface analysis, multi signal analysis.

Student will be expose on practical technique for eddy current testing, ultrasonic testing, liquid penetration technique and magnetic particle testing.

References

1. Libby, L.H. *Introduction to Electromagnet Non Destructive Test Methods*, New York.
2. McGonnagle, W.J., *Non Destructive Testing. London: Gordon and Breach*, 1971.
3. Hendry, A.W., *Elements of Experimental Stress Analysis*, Pergamon, New York, 1977.
4. *Metals Handbook, 8th Edition. Vol.10, Failure Analysis*, ASM International, and Ohio USA.

Department of Manufacturing Management

Total Quality Management (BMFP 3593)

Objectives

(a) To expose students to the basic concept of total quality management.
(b) To enable students in applying the continuous improvement techniques at various types of industry.
(c) To enhance students skill of decision making of the product quality through quality value added and engineering principle.

Synopsis

Total Quality Management consists of philosophy, principles and concepts which is important in an organization for brightening future of the business. The topics cover are; Management tools and techniques; European Quality Awards; Measurement of quality; customer, employee and product development; Quality Costing; Benchmarking; Process Management and Improvement; Leadership, Policy Deployment and motivation.

References

1. Dahlgaard, Jeans J., *Fundamental of Total Quality Management : Process Analysis and ImprovementTools and Method for Improvement*, 1998.
2. Geotsch, David.L, *Quality Management* : *Introduction To Total Quality Management For Production, Processing and Services*, Prentice Hall, 2003.
3. Oakland John S., *Total Quality Management : Text With Cases*, Butterworth Heinemann, 2000.

Ergonomics (BMFP 3553)

Objectives

(a) To expose the students about the influences of human relation factors to production productivity.
(b) To enable students measuring and analyzing the anthropometric data which to be used in product design.
(c) To enhance students competency in designing product with ergonomics characteristics.

Synopsis

This course explains the human factors aspect in determining productivity of an operation. The inclusive topics are; Introduction to human anatomy and human posture and body mechanism; Anthropometric; Ergonomic design for workstation; Working body position – sitting and standing; Human top body studies; Design for manual works; physiology; Human capability principle; Working environment factors; hot, cold, noise and humid; Measurement of performance and skills; Human interaction and machine; Visual sensory systems, auditory, tactile and vestibular system, Cognition, Display, Control, Engineering Anthropometry; Biomechanics of work.

References

1. Salvendy G., *Handbook of Human Factors and Ergonomics,* 3rd Edition, John Wiley & Sons, 2006.
2. R. Bridger, *Introduction to Ergonomics*, 2nd Edition, CRC, 2003.
3. Anshel J., *Visual Ergonomic In The Workplace*, CRC, 1998.
4. K.H.E Kroemer, K.B. Kroemer, K.E. Kroemer, *Ergonomics : How To Design For Ease and Efficiency*, Prentice Hall, 2000.

Organizational Behavior (BMFP 3572)

Objectives

(a) To expose students to elements in organization behavior.
(b) To enable students in designing human resource organization system in the manufacturing centric industry.
(c) To enhance students knowledge on dynamic organization and enable to manage the human resource at any organization.

Synopsis

Understanding the organization behavior is necessary for effective human resource Imanagement. The topics cover are; ntroduction to Organisational Behavior; Basic human processes, Perception and learning, Individual differences and emotional stress on the job; The individual in organisation, work-related attitudes and career dynamics; Group dynamics, group process and teamwork, communications, decision making in organization and interpersonal behaviour; Influencing others, organizational culture, creativity and innovation; Organisational processes, organisational structure and design and managing organization change.

References

1. Stephen P.Robbins, *Organisation Behavior*, 10th Edition, Prentice Hall, 2002.
2. James G.Clawson, *Practical Problems In Organizations : Cases in Leadership, Organization Behavior and Human Resources, 1st Edition*, Prentice Hall, 2002.
3. Corwling A., Mailer C., *Managing Human Resource*, 3rd Edition, Butterworth Heinemann 1998.

Operational Research (BMFP 3562)

Objectives

(a) To enable students in demonstrating (in writing) a systematic understanding of linear programming methods, queuing theory, and discrete event simulation.
(b) To enable students in analyzing industrial situations, formulate optimization problems.
(c) To give view to students, so that they enable to recognize industrial situations giving rise to queues and able to analyze simple queue models.

Synopsis

Situations arising from the fields of transportation, water resources, manufacturing and many others give rise to network flow models. A flow network is a collection of nodes and arcs. The topics cover are; Mathematical Operations Research Models, Operation Research Techniques, Simulation Modeling, Introduction To Linear Programming, The Simplex Method, Duality and Sensitivity Analysis, Transportation Models and it variants, Network Models.

References

1. Hamdi, A.Taha, *Operation Research : An Introduction*, 7th Edition, 2000.
2. Paul A. Jensen, Jonathan F. Bard, *Operations Research Models and Methods*, John Wiley Inc., 2003.
3. Tito A..Ciriani, Stefano G., Elli L.Johnson, Roberto T., *Operational Research In Industry*, Purdue University Press, 1999.

Manufacturing Economy (BMFP 3582)

Objectives

(a) To introduce students to the concepts, principles and techniques engineering economy.
(b) To enable students in analyzing cost effectiveness and making decision for investment in new technology.
(c) To enable students to do the systematic evaluation of the benefits and costs of projects involving engineering design and analysis.

Synopsis

Engineering economy quantifies the benefits and costs associated with engineering projects to determine whether they make (or save) enough money to warrant their capital investments. The topics cover are; Introduction to the concepts and principles of engineering economy; Factors: How Time and Interest Affect Money; Nominal and Effective Interest Rates; Present Worth Analysis; Annual Worth Analysis; Rate of Return Analysis; Single and Multiple Alternatives; Benefit Analysis and Public Sector Economics; Making Choices: The Method, MARR, and Multiple Attributes. Replacement and Retention Decisions; Selection from Independent Projects Under Budget Limitation. Breakeven Analysis; Effect of Inflation; Cost Estimation and Indirect Cost Allocation.

References

1. Sullivan, William G., *Engineering Economy*, 12th Edition, McGrawHill, 2003.
2. Donovan Y., *Modern Engineering Economy*, Wiley, 1993.
3. Ted G.Eshenbach, *Engineering Economy : Applying Theory to Practise (Engineering and Technology)*, 2nd Edition, Oxford University Press, 2003.

Project Management (BMFP 4542)

Objectives

(a) To expose students to the concepts of engineering project management.
(b) To expose students to tender procedures and contract policy.
(c) To enable students in operating a project with knowledgeable in project planning and control and contract strategy.

Synopsis

Project Management course is essential for most of engineer in delivering projects with meet predetermined objectives. This course consists of two Parts; Part I - Project Concepts; Project Appraisal and Risk Management, Project Appraisal and Environmental Effects, Cost Estimating in Contracts and Projects, Project Finance; Project Cash Flow; Project Organization. Part II – Project Operations; Planning, Project Control, Using Earned Value Techniques, Contract Strategy, Tender Procedure and Contract Policy.

References

1. Smith Nigel J., *Engineering Project Management*, Blackwell Science, 1995.
2. Wysocki Robert K., *Effective Project Management*, Wiley, 2nd Edition, 2000.
3. James P.Lewis, *Fundamentals of Project Management : Developing Core Competencies To Help Outperform The Competition*, 2nd Edition, American Management Association, 2002.

Manufacturing Strategy (BMFP 4563)

Objectives

(a) To expose students to the principles and concepts of manufacturing strategy.
(b) To enable students in developing a manufacturing strategy using the provided methodologies.
(c) To enable students in making decision on appropriate strategies in the focused manufacturing.

Synopsis

Manufacturing Strategy is a systematic and valuable tool for evaluating the production program and helping to develop a world-class production system. The topics cover are; International comparisons; Developing a Manufacturing Strategy – Principles and Concepts; Order-Winners and Qualifiers; Developing a Manufacturing Strategy – Methodology; Process choices; Product Profiling; Focused Manufacturing – Principles, Concepts and methodology; Make of Buy and Managing Supply Chain; Manufacturing Infrastructure Development; Accounting, Finance and Manufacturing Strategy.

References

1. Terry J.Hill, *Manufacturing Strategy : Text and Cases*, McGraw Hill/Irwin, 1999.
2. Miltenburg J., *Manufacturing Strategy : How To Formulate and Implement a Winning Plan*, 2nd Edition, Productivity Press, 2005.
3. Robert B., Andrew S.Grove, *Strategy Is Destiny : How Strategy Making Shapes A Company's Future*, 1st Edition, Free Press, 2001.
4. Patricia E.Moody, Richard E.Mooley, *The Technology Machine : How Manufacturing Will Work In Year 2020*, Free Press, 1999.

Lean Manufacturing (BMFP 4523)

Objectives

(a) To expose students to the concepts of lean manufacturing – wastes elimination.
(b) To enable students to use lean tools and techniques in manufacturing industry.
(c) To enhance students understanding and knowledge of the lean manufacturing implementation strategy at various types of industry.

Synopsis

This course covers the terms, concepts and techniques involved in Lean Manufacturing that was derived from the Toyota Production System. The topics covers are; Lean philosophy - The seven wastes; Lean techniques; Value Stream Mapping, 5S' housekeeping, Poka yoke, Total Productive Maintenance, Visual Management, SMED, One-Piece-Flow, Cellular Manufacturing, Standardized work, Tact Time, Production Leveling, Kanban, Kaizen (Contimuous Improvement.

References

1. Kenneth D., *The Lean Manufacturing Pocket Handbook*, DW Publishing, 2003.
2. Feld William M, *Lean Manufacturing : Tools, Techniques and How To Use Them*, St. Lois Press, 2000.
3. Dennis P.Hobb, *Lean Manufacturing Implementation : A Complete Execution Manual For Any Sizes Manufacturer*, J. Ross Publishing, Inc., 2003.

Facilities Planning And Design (BMFP 4533)

Objectives

(a) To expose students to the lean manufacturing concepts that has been adopted from Toyota Production System.
(b) To enable students in eliminating wastes at production/manufacturing area.
(c) To give experience to students in applying tools and techniques for continuous improvements purposes.

Synopsis

New production techniques, new material handling equipment, larger investments, higher expectations, when it comes to facilities planning there is no room for "business as usual". Every company must insist on the highest return on their investment. This course consists of two parts; Part I – Facilities Planning; consists of each step in the planning process, from defining requirements to developing alternative material handling techniques and manufacturing/water house operations to selecting and evaluating facilities plans. Part II – Facilities Design; Product and Equipment Analysis, Process and Material Flow Analysis, Traditional Approaches to Facility Layout, Models for the Layout Problem and Basic Algorithms for the Layout Problem.

References

1. James A.Tompkins, *Facilities Planning*, 3rd Edition, Wiley, 2003.
2. Sunderesh S.Heragu, *Facilities Design*, 1st Edition, PWS Pub. Co.,1997.
3. Roger P.Wessel, Paul R.Smith, Mark M.Neitlich, Anand K.Seth, William L.Proter, *Facilities Engineering and Management Handbook : Commercila, Industry and Institutional Building*, McGraw Hill Professional Publishing, 2001.

Modeling & Simulation (BMFP 4553)

Objectives

(a) To expose students the applications of commercial software in modeling and simulation to industrial engineering problems.
(b) To enable students to use proper steps for a successful simulation analysis.
(c) To enable students in learning and applying the analytical techniques for interpreting input data and outputs results pertinent to simulation models.

Synopsis

This course is specifically designed to give a working template for: Process simulation assessment and planning, Implementation steps for effective simulation, Results measurements for continuous improvement. Initially, students will be taught various aspects of computer-aided modeling for performance evaluation of dynamic systems. The topics covers are; Dynamical system, Stochastic Generators, Spatial Distributions, Stochastic Data Representation, Modeling Time-Driven Systems, Exogenous Signals and Events, Markov Processes, Event-Driven Models and System Optimization and Simulation of Manufacturing Systems.

References

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

8. DIPLOMA PROGRAM

8.1 Diploma of Manufacturing

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 customers' 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.

By Semester Subject Schedule

First Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
DACW 1332	Phylosophy of Science & Technology	2	2	0
DACW 1412	Technical Communication I	2	1	2
DACS 1212	Elementary Mathemathics	2	2	0
DACS 1263	Basic Physics	3	2	2
DACS 1232	Chemistry	2	1	2
DENE 1113	Electric & Electronic Principle	3	2	3
DITG 1113	Computer Programming	3	2	3
	Total	17	12	12

First Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum I	1	0	3
DACW 1312	TITAS	2	2	0
DACW 1322	Malaysian Socio-Economic Development	2	2	0
DACS 1222	Calculus	2	2	0
DMFD 1313	Manufacturing Practice	3	0	9
DMFD 1133	Engineering Graphics & CADD	3	1	4
DACS 1273	Engineering Statistic	3	2	3
	Total	16	9	19

Second Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
DACW 1422	Technical Communication II	2	2	0
DACS 2212	Engineering Mathematics	2	2	0
DENG 2113	Microprocessor	3	2	3
DMFD 2823	Statics & Dynamics	3	2	3
DMFD 2833	Fluid Mechanics	3	2	3
DMFD 2222	Material Science	2	1	3
DMFD 2323	Manufacturing Process	3	2	3
	Total	18	13	15

Second Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
BKK* ***1	Co-Curriculum II	1	0	3
DACW 1352	Ethnic Relation	2	2	0
DMFD 2113	Machine Design	3	2	3
DMFD 2853	Mechanics of Materials	3	2	3
DMFD 2843	Thermodynamics	3	2	3
DMFD 2433	Instrumentation & Control	3	2	3
DMFD 2542	Metrology	2	1	3
	Total	17	11	18

Semester Break

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
DMFU 2363	Industrial Training	3		
	Total	3		

Third Year – First Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
DACW 2412	Technical Communication III	2	2	0
DMFD 3413	Fluid Power	3	2	3
DMFD 3513	Manufacturing Management	3	2	3
DMFD 3122	CAD/CAM	2	1	3
DMFD 3333	CNC Technology	3	2	3
DMFD 3543	Engineering Economy	3	2	3
	Total	16	11	15

Third Year – Second Semester

Code	Subjects	Credit	Contact Hours	
			Lecture	Pract/Tutorial
DMFD 3823	Design Project	3	0	9
DMFD 3253	Engineering Materials	3	2	3
DMFD 3463	Robotics & Automation	3	2	3
DITG 3113	Manufacturing Information Technology	3	2	3
DMFD 3582	Quality Control	2	1	3
	Total	14	7	21

Curriculum Schedule

	First Year		Second Year		Third Year		Total
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	
University Compulsory Subject	DACW 1332 Phylosophy of Science & Technology	DKK* ***1 Co-Curriculum I	DACW 1422 Technical Communication II	DKK* ***1 Co-Curriculum II	DACW 2412 Technical Communication III		21
	DACW 1412 Technical Communication I	DACW 1312 TITAS	DACS 2212 Engineering Mathematics	DACW 1352 Ethnic Relation			
		DACW 1322 Malaysia Socio-Economic Development		DMFU 2363 Industrial Training Semester Break			
Program Core Subject	DACS 1263 Basic Physics	DACS 1222 Calculus	DENG 2113 Microprocessor	DMFD 2113 Machine Design	DMFD 3413 Fluid Power	DMFD 3823 Design Project	80
	DACS 1232 Chemistry	DACS 1273 Engineering Statistic	DMFD 2823 Statics & Dynamics	DMFD 2853 Mechanics of Materials	DMFD 3513 Manufacturing Management	DITG 3113 Manufacturing Information Technology	
	DACS 1212 Elementary Mathematics	DMFD 1313 Manufacturing Practice	DMFD 2833 Fluid Mechanics	DMFD 2843 Thermodynamics	DMFD 3122 CAD/CAM	DMFD 3582 Quality Control	
	DENE 1113 Electric & Electronic Principle	DMFD 1133 Engineering Graphic & CADD	DMFD 2222 Material Science	DMFD 2433 Instrumentation & Control	DMFD 3333 CNC Technology	DMFD 3253 Engineering Materials	
	DITG 1113 Computer Programming		DMFD 2323 Manufacturing Process	DMFD 2542 Metrology	DMFD 3543 Engineering Economy	DMFD 3463 Robotics & Automation	
Total	17	16	18	20	16	14	101

8.2 Diploma Program Syllabus

8.2.1 Compulsory University Subjects

Philosophy of Science & Technology (DACW 1332)

Objectives

(a) To analyze the impact of science and technology on Islamic civilization and mankind.
(b) To make a comparison between the past and present civilization in term of the concept, impact and the achievement of science and technology.

Synopsis

This course discusses on knowledge concept, philosophy, science and technology in Islam; Science and technology according to western scholars; Concept and the achievement of the Islamic civilization in mathematics, astronomy, geography, physics, chemistry, pharmacy, medicine; Cosmology concept; and Islam and current issues, including the latest ICT development

References

1. Ramli Awang, *Falsafah Sains dan Teknologi,* PTS Publications & Distributors Sdn. Bhd., Kuala Lumpur, 2003.
2. Sulaiman Nordin, *Sains Menurut Perspektif Islam,* Penerbit Universiti Kebangsaan Malaysia, 1995.
3. Sulaiman Nordin, *Falsafah dan Islam,* Penerbit Universiti Kebangsaan Malaysia, 1993.

Technical Communication I (DACW 1412)

Objectives

(a) To expose students to basic principles in technical communication.
(b) To train students to participate and perform written and oral intra & inter office communication.
(c) To help students to experience and acquire job seeking skills.
(d) To encourage and train students to participate actively in group dynamics at working places.

Synopsis

The course offers students the opportunity to be trained to participate in intra and inter office communication (e.g. memo and letter correspondence). They will also be taught on how to acquire job seeking related skills (e.g. advertisement browsing, writing letter of job application, attending interviews) and also participate in group dynamics at their respective working places. This will include participating in briefings, brainstorming sessions as well as meetings.

References

1. J.C. Lim, *Wawasan SPM Bahasa Inggeris 1119,* Pustaka Delta Pelajaran Sdn. Bhd., 2001.
2. J.C. Lim, *Malaysian University English Test (MUET),* Course book, Pustaka Sarjana Sdn Bhd., 2001.
3. Jenny Ho, Dewi Semanjalan, Ainon Omar and Nali Muthusami, *Fokus Bahasa Inggeris,* Penerbitan Pelangi Sdn. Bhd., 2003.

Co-Curriculum I & II (DKK* *)***

Objectives

(a) To producing active graduates physically, emotionally and intellectually.
(b) To develop the sense of cooperating in managing, planning and executing activities.
(c) To develop students leadership characteristics.

Synopsis

(a) Games
Soccer, Rugby, Netball, Badminton, Takraw, Hockey.
(b) Clubs
St. John, ROTU, Pengakap Kelana, Puteri Islam, Pertahanan Diri.
(c) External Education
Orientering/Compass Marching, Abseiling/Flying Fox, Water Safety/ Canoe, Survival Skills.

Islamic Civilization and Asian Civilization I (TITAS 1) (DACW1312)

Objective

(a) To encourage mutual understanding and respect among Malaysians.
(b) To strengthen the spirit of oneness and patriotism among Malaysians.
(c) To produce a globalize and broad minded students.
(d) To empower Malaysian to build a high civilized nation and at the same time uphold the universal values.

Synopsis

This subject discusses about the essence of civilization, their worldview and values of specifically the Indian, Chinese and Japanese civilizations and the autochthon and Malay civilization in Malaysia. Simultaneously, it covers the challenges faced by the Islamic and Asian Civilization in the so-called globalization era and in the future.

References

1. Afifah Abu Yazid, *Pengajian Tamadun Asia,* Edisi Kedua, Penerbit PTS, 2003.
2. *Islamic Civilization and Asian Civilization*, Penerbit Universiti Malaya, 2001.
3. Belwood P., *Prehistory of the Indo-Malaysian Archipelago,* University of Hawaii Press, 1997.

Socio-Economic Development of Malaysia (DACW 1322)

Objective

(a) To give a comprehensive exposure to students concerning social and economic transformation process in Malaysia.
(b) To educate students on roles and influences of the socialists on economic development.
(c) To understand the value of oneness in a multi racial nation in the effort to maintain political and economical stability

Synopsis

Social and economic development in Malaysia is caused by a long history process. In this process, there are interferences from internal and external community and government influences. Due to that, Malaysia emerges as a successful third world country economically. This course stresses on society's roles, environment and science & technology in the country's development.

References

1. Nazarudin Mohd Jali et.al., *Kenegaraan Malaysia: Sejarah Awal Kemerdekaan dan Pembentukan Malaysia*, Kumpulan Budiman, (1996).
2. Chamhuri Siwar & Surtahman Kastin Hasan, *Ekonomi Malaysia*, Longman, 1999.
3. Mohd Nordin Sopiee, *From Malayan Union to Singapore Separation*, University Malaya Press, 1974.

Technical Communication II (DACW 1422)

Objectives

(a) To expose students to the techniques of proposal writing.
(b) To assist students to acquire skills in conducting surveys and data gathering from primary and secondary sources.
(c) To enhance students' skills in writing technical reports using appropriate format, mechanics and conventions.
(d) To train students to perform oral presentation and skills related to public speaking.

Synopsis

The course will train students to obtain skills in writing proposals and reports. In the process, students will be required to obtain input/information from primary and secondary sources, i.e. conducting surveys/observations/ interviews or referencing skills such as library research and internet browsing. The writing of proposal and reports will involve near authentic tasks, which will culminate with the oral presentation of the written report.

References

1. Ahmad Rizal Selamat, Nina Ong Sue Lyn, Razilah Abdul Rahim, Rita Abdul Rahman, Safiah Sidek & Tg Shahraniza Tg Abd Jalal, *Alpha English I*, McGraw Hill, 2003.
2. Chanthra Balasingam, Rathabai Kunchiram & Soo Kim Suwe, *Progressive English for Malaysian College Students*, McGraw Hill, 2001.
3. J.C. Lim, *Malaysian University English Test (MUET) Course book*, Subang Jaya: Pustaka Sarjana Sdn Bhd., 2001.

Engineering Mathematics (DACS 2212)

Objectives

(a) To introduce students with multi-variables functions and vectors.
(b) To understand the relationship between functions and vectors.
(c) To apply to engineering disciplines.

Synopsis

To introduces students with multi-variables functions, applications of the definite integral and vectors. The syllabus is developed by introducing the concepts of the limits, continuity, derivative and integration, vectors, followed by learning various techniques in solving the problems and its application in physical and engineering field..

References

1. Anton H., *Calculus*, 4th Edition, 1994.
2. Bradley G.L. & Smith K.L, *Calculus*, Prentice Hall, 1995.
3. Willie C.R. *Advanced Engineering Mathematics*, McGraw Hill, 1975.

Ethnic Relation (DACW 1352)

Objectives

(a) To expose students on cultural, community and ethnic plurality.
(b) To give the insight of social unity in Malaysia and ethnic harmonial relation basis.
(c) To increase their understanding on ethnic relation and cultural plurality challenges in Malaysia.
(d) To give understanding and awareness on Islamic 'Hadhari' concept and ethnic relation.
(e) To involve students on creative learning experiences on Malaysian community cultural living and social practices.

Synopsis

This subject focuses on discussion about basic cultural concept and ethnic relation. It also focuses on exposing and monitoring ethnic relation development in creating a Malaysian community based on Malaysia mould and relation between regions in ASEAN. Besides that, this subject also emphasize on global challenges related to culture and ethnic relation in Malaysia and Asia. It also introduces students to ethnic relation based on Islamic perspective.

References

1. Syed Mohamad Naquib Al-Attas, *Islam dan Sejarah Kebudayaan Melayu*, UKM, 1971.
2. D.Y.U. Wu, H. Mc Queen & Yamamoto Y.,*Emerging Pluralism in Asia and the Pacific Hong Kong*, The Chinese University of Hong Kong, 1999.
3. Abdul Aziz Bari, *Perlembagaan Malaysia: Asas-asas dan Masalah,* Dewan Bahasa dan Pustaka, 2000.

Technical Communication III (DACW 2412)

Objectives

(a) To strengthen students' fundamentals of English.
(b) To use English as an effective communication tool needed at their work place.
(c) To make students involve effectively in report writing, group discussions and oral presentations.

Synopsis

Students will also be exposed to the various aspects of technical writing based on some theoretical principles of writing a report that is investigative in nature. Students will also be exposed/introduced to reading (text/ instructions and manuals) which are technical in nature so as to prepare them for their needs in their various technical fields/at their work place.

References

1. Bailey, P.E., *Writing & Speaking At Work: A Practical Guide For Business Communications*, 2nd ed., Prentice Hall, 2002.
2. Cummings, M. Graves, *Listen, Speak, Present: A Step-by-step Presenter's Workbook*, Heinle & Heinle, 1992.
3. Delaware Technical & Community College, *Writing Skills For Technical Student*, 4th ed., Prentice Hall, 2002.

8.2.2 Program Core Subjects

Physics (DACS 1263)

Objective

(a) To understand Physics basic concept.
(b) To understand basic quantity and physics phenomenon in mechanic, static, electric and magnet.
(c) To understand quantity physics calculation techniques and methods.
(d) To be able to use basic physics concept in engineering.

Synopsis

Mechanics, Optics, Geometry, Substance and Heat, Electricity and Magnetization, Pendulum and Waves, Atoms and Nucleus.

References

1. Giancolli, *Physics For Scientists and Engineers*, Prentice Hall, 1993.
2. Halliday, Resnick Walker, *Fundamental of Physics,* 6th Edition, Wiley, 1996.
3. J. Sanny, W. Moebs, *University Physics*, McGraw Hill, 1995.

Chemistry (DACS 1232)

Objective

(a) To expose student on chemistry basic concepts, electron structure.
(b) To introduce students with Organic Chemistry.

Synopsis

Elements, atoms and solids. Stoikiometry. Gas properties. Chemical equilibrium. Thermo chemistry. Analyze common elements. Electron structure and periodic table. Phase equilibrium. Chemistry Kinetic. Introduction to organic chemistry

References

1. Raymond Chang, *Chemistry,* 8th Edition, McGraw Hill, 2005.
2. Halimaton Hamdan, Hanim Awab and Mohd Nazlan Mohd Muhid, *Kimia Asas Sains dan Kejuruteraan,* Penerbit UTM, 2001.
3. Hill Petrucci, *General Chemistry: An Intergrated Approach,* Prentice Hall, 2002.

Mathematics (DACS 1212)

Objective

(a) To introduce students with basic mathematics.
(b) To assist students in applying basic mathematical concept in engineering subjects.

Synopsis

Numbering polynomial system, trigonometry, functions and graphs, advance functions and solutions of equations, geometry coordinates matrix and complex numbers.

References

1. Bird, J., *Basic Engineering Mathematics,* Butterworth-Heinemann, 2000.
2. Stroud, K. A., *Engineering Mathematics,* Mc Millan, 1995.
3. Any books on College Algebra.

Electrical & Electronics Principle (DENE 1113)

Objective

(a) To introduce the students with the basic concept of electrical and electronic.
(b) To correctly analyze the simple electrical and electronic circuit problem using circuit analysis theory and techniques.
(c) To understand the function and operation of DC and AC circuits analysis.
(d) To understand and explain the construction of capacitor and magnetism.
(e) To understand the concept of semiconductors theory and devices.

Synopsis

This module provide knowledge and understanding relating to electrical and electronic principles, passive elements, DC and AC circuits analysis, transformer, semiconductor theory and devices: diode, bipolar junction transistor, op-amp, timer and integrated circuits.

References

1. Bobrow L.S., *Fundamental of Electrical Engineering,* 2nd Edition, Oxford University Press, 1996.
2. Cogdell J. R., *Foundations of Electrical Engineering,* Prentice Hall, 1999.
3. Irwin J.D., *Basic Engineering Circuit Analysis,* 1st Edition, Wiley, 2002.

Computer Programming (DITG 1113)

Objectives

(a) To introduce students with theory and sequence in computer programming.
(b) To teach students the latest computer language such as C++ and visual basic.

Synopsis

Introduction of this course consists of basic principles of computer system especially pertain to the computer programming, software development methodology and life cycle. The programming parts include the basic programming principles (e.g.: syntax, semantic, compiling and linking). Also include are methods for problem solving, data type, dynamic and abstract data. Advance chapters such as repetition, function and array are learnt towards the end of this course. Tools for the practical works of this course is Microsoft Visual C++.Net

References

1. Behrouz A. Farouzan & Richard G. Gilberg, *Computer Science: A Structured Programming Approach Using C++*, 2nd Edition, Brooks/Cole, 2004.
2. Deitel & Dietel, *C++ How to Program*, 3rd edition, Prentice-Hall, 2000.
3. John R. Hubbard, *Fundamentals of Computing with C++, Schaum's Outline Series*, McGraw Hill, 1998.

Calculus (DACS 1222)

Objectives

(a) To find the limits of the functions (intuitive approach and computational) and to explain the continuity of a function.
(b) To find the derivatives of the functions and to study various applications of the derivative.
(c) To evaluate the integrals by using various techniques and to calculate the area of a region and volume of revolution using integration technique.

Synopsis

This subject consists of 5 chapters: Limits and Continuity, The Derivatives, Applications of Derivative, Integration and Applications of Integration. The syllabus is developed by introducing the concepts of the limits, continuity, derivative and integration, followed by learning various techniques in solving the problems and its application in physical and engineering fields.

References

1. Abd. Wahid Md Raji, Hamisan Rahmat, Ismail Kamis, Mohd. Nor Mohamad dan Ong C.T., *Calculus for Science and Engineering Students*, UTM & Pusat Pengajian Sains Kolej Universiti Tun Hussein Onn, 2000.
2. Anton H., Bivens I., Davis S., *Calculus,* 7th edition, John Wiley and Sons Inc., 2000.
3. Thomas G.B and Finney R.L., *Calculus and Analytic Geometry,* 9th Edition, Addison-Wesley Publishing Company, 1996.

Engineering Statistics (DACS 1273)

Objectives

(a) To exposed students on statistics area as its importance in manufacturing engineering activities.
(b) To teach data gathering from various sources and how to be presented.
(c) To teach statistical techniques so that these data can help them in the process of making decision.

Synopsis

About Statistics, Probability, Random variables, Univariant, Special Scatter, Scattered Sampling, Estimation, Hypothesis Test, Simple Linear Regression and Correlation, Variant Analysis

References

1. Walpole, R.E., and Myers, R. H., Probability and Statistics for Engineers and Scientists, 5th Edition, Macmillan, 1995.
2. Prem S. Mann., Introductory Statistics, 5th Edition, John Wiley & Sons. 1999.
3. Warren Chase, Fred Bown, *General Statistics*, 4th Edition, John Wiley & Son. 1998.

Manufacturing Practice (DMFD 1313)

Objectives

(a) To introduce students from various background concerning basic manufacturing practices.
(b) To be able to interpret engineering drawings.
(c) To make projects using various hand tools.

Synopsis

The practice consists of introduction to basic knowledge of using manual hand tools and equipments, machine tools, joining process and fabrication techniques, casting and some manual work within manufacturing daily activities. It introduces common equipments for performing manufacturing works such as lathe and milling machine, arc welding, TIG/MIG welding sheet metal forming, basic foundry kit etc. Due to its nature as acquire any knowledge concerning the practices.

References

1. Kalpakjian S. & R. Schmid, *Manufacturing Engineering and Technology*, 5th edition, Prentice Hall, 2006.
2. Kibbe, Neely, Meyer & White, *Machine Tool Practices*, 5th Edition, Ptentice Hall, 1995.
3. Amstead B.H., *Manufacturing Processes*, 3rd edition, John Wiley & Son, 1997.
4. Mikell P. Groover, *Fundamental of Modern Manufacturing*, Prentice Hall Int. Ed., 1996.

Engineering Graphic & CADD (DMFD 1133)

Objectives

(a) To make students understand on how engineering graphics are communicated visually in industry.

(b) To teach students to use 2D and 3D CAD software in producing the 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, CAD technical drawings using orthographic projections, sections, auxiliary views and isometric drawings. Emphasis is placed on creating drawings that are neat, correctly dimensioned using industry standards. Students will use freehand sketches methods and CAD to develop visualization skills and create the engineering drawings. The course will consist of lecture and practical session. A major part of the course consists of performing structured laboratory exercises. Classroom activities will complement and the support the lab exercises with explanations and demonstrations of required activities.

References

1. Lecturer Note, *Engineering Graphics: CADD for BMFR1113 & DMFD1133*, FKP, KUTKM, 2003.
2. Mohd Fadzil Daud dan Khairul Anwar Hanafiah, *Lukisan Kejuruteraan: Panduan Asas*, Penerbit UTM, 2000.
3. Giesecke, Mitchell, Spencer, Hill, Dygdon, *Novak Technical Drawing*, 12th edition, Prentice Hall, 2002.
4. French, Svensen, Helsel, Urbanick, *Mechanical Drawing, CAD-Communications*, 12th Edition, McGraw *Hill, 1997*

Microprocessor (DENG 2113)

Objective

(a) To make students understand the fundamental knowledge of microprocessor system, architecture of microprocessor.

(b) To help students to develop assembly language program for microprocessor applications.

Synopsis

The subject covers overview of microprocessor: Arithmetic Logic Unit (ALU), 8085 Microprocessor Architecture, Input/Output Interfacing, Peripheral I/O Technique, Memory Mapped I/O, Peripheral-Controlled Data Transfer, Interrupts, Operation Sequence, Polling, Control & Timing, 8085 Instructions, Assembly Language Programming Technique, Branch, Counter & Delay and Stack, Subroutine and Interrupt Program

References

1. Charles M. Gilmore, *Microprocessors: Principles and Applications*, McGraw Hill, 2000.
2. Ramesh S. Gaonkar, *Microprocessor Architecture, Programming and Applications with 8085*, 4th Edition, Prentice Hall, 1999.
3. Barry B. Brey, *The Intel Microprocessor*, 6th Edition, Prentice Hall, 2003.

Static & Dynamic (DMFD 2823)

Objective

(a) To give students understand the principles of statics, dynamics of particles and rigid bodies.
(b) To explain the effect of loads on particles and rigid bodies.
(c) To develop the skills in solving the numerical problems.

Synopsis

Introduction and basic concept of static and dynamics. Forces system and its combination. Particle equilibrium and stiff body. Dividing forces, centroid and structure analysis. Particle kinematics and stiff body. Kinetic (force-acceleration relation), work-energy, impulse-momentum) for particles and particles system. Moment of inertia for stiff body. Kinetic for stiff body.

References

1. Prentis, J.M., *Dynamics of Mechanical Systems*, Ellis Howard, 1980.
2. Norton, *Dynamics Machinery*, 4th Edition, Wiley, 1985.
3. Abdul Ghani Mohammad, *Mekanik Badan Tegar: Dinamik*, UTM, 1996.

Mechanics of Materials (DMFD 2853)

Objective

(a) To expose students to forces acting on materials.
(b) To teach students on calculating stress, strain, bending moments, torques etc.

Synopsis

Forces on material. Introduction to the concept of stress and strain and types of stresses. Shear force diagram and bending moment, simple bending and fiber. Shaft torque. Spring. Elastic constant. Thin cylinder and complex stress. Failure theory.

References

1. Benham P.P & Crawford R.J., *Mechanics of Engineering Material*, Longman, 1989.
2. Boresi, Arthur, P. Schmidt, Richard J. & Sidebottom, Omar, M. *Advanced Mechanics of Material*, 5th Edition John Wiley & Sons, Inc., 1993.
3. Crossland B. & Morrison J., *Mechanics of Machines*, Longman, 1985.

Machine Design (DMFD 2113)

Objective

(a) To give basic knowledge on design principles.
(b) To teach students in calculating and analyzed components or machine elements.

Synopsis

Introduction to design principles. Introduction to machine design and structures. Drawing and machine layout. Basic gear, cams, fasteners, springs, joints. The importance of surface finish. Design for stiffness, strength and capabilities. Surface touch. Wear and lubrication. Tolerance and fit. Design and selection elements such as shaft, bolt, welding, bearing, brake and spring.

References

1. Juvinall, R.C. & Marshek, K.M., *Fundamental of Machine Component Design*, 2nd Edition, John Wiley & Sons, 1991.
2. Spotts M. F., *Design of Machine Elements*, Prentice Hall, 1980.
3. Robert C. Juvinall & Kurt M. Marshek, *Fundamentals of Machine Component Design*, 5th Edition, John Wiley & Son, 1999.

Fluid Mechanics (DMFD 2853)

Objective

(a) To expose students on basic properties of fluids.
(b) To teach students on hydrostatic equations, forces analysis and Bernoulli principles.

Synopsis

Introduction to basic properties of fluids. Definition and meaning of pressure. Derivation of hydrostatic equations and its application in the area of pressure measurement, static forces analysis on submerged surface, buoyancy analysis and floating. Introduction to dynamic stream and analyzed method concerning stream problems. Bernoulli equation in measuring velocity, flow rate and reduced tubes in pipe and channel system or pipelines.

References

1. White, F.M., *Fluid Mechanics*, 3th Edition, McGraw Hill, 1996.
2. William, S.Janna, *Introduction to Fluid Mechanics*, PWS Publishers, 1983.
3. Fox, R.W. & McDonald, A.T. *Introduction to Fluid Mechanics*, 4th Edition, John Wiley, 1994.

Thermodynamics (DMFD 2843)

Objective

(a) To give students exposure and understanding concerning the energy conservation principle and thermodynamic laws.
(b) To teach students on how to calculate the internal energy change for a process as well as the thermodynamics cycles.
(c) To identify different working fluid characteristics and able to use the physical and chemical properties in performance calculation either for the steam of gas or other thermodynamics system.
(d) To calculate various thermodynamics properties using various forms of working fluids properties.

Synopsis

Sources of energy and energy conservation, concept and definition of energy, heat transfer works and fluid properties. First Law of Thermodynamic and thermodynamic process. Second Law of Thermodynamic and thermodynamic cycles.

References

1. Eastop, T.D. & McConkey A., Applied Thermodynamics for Engineering Technologist, 4th Edition, Longman, 1998.
2. Michael, J. Moran and Howard N. Saphiro, Fundamental of Engineering Thermodynamics, John Wiley, 1988.
3. Spalding, D.B. and Cole E.H. *Engineering Thermodynamics*, 3rd Edition, ELBS, 1973.

Material Science (DMFD 2222)

Objectives

(a) To give the students understand the basic concept of Material Science in term of interatomic bonding and crystal structure.
(b) To analyze different type of material behaviors so that they can relate it with the processing requirements.
(c) To understand and describe how material deform or break as a function of applied load, time, temperature and another condition.

Synopsis

The course is given to introduce the student to the basic concept of Material Science that involved study on introduction of materials, atomic structure and interatomic bonding, the structure of crystalline solids, imperfection in solid and diffusion in materials. The course also covers explanation on mechanical properties of metals, dislocation and mechanical properties of materials.

References

1. William D. Callister, Jr., *Materials Science and Engineering – An Introduction*, 5th Ed. John Wiley & Sons Inc., 2001.
2. William F. Smith, *Principle of Materials Science & Engineering*, 3rd Ed., Mc. Graw Hill, 1996.
3. J.F. Shackelford, *Materials Science and Engineering – An Introduction*, 5th Ed., Prentice Hall, 2000
4. W. Bolton, *Engineering Materials Technology*, 3rd Edition, BH Publisher, 2001

Manufacturing Process (DMFD 2323)

Objective

(a) To identify different types of manufacturing process by observing type and shape of product.
(b) To apply proper safety procedures in the manufacturing setting.
(c) To apply modern tool geometry and to select tool materials for the proper machining processes.
(d) To calculate and specify tools speeds, feeds and depth of cut from standard equations or from manufacturer's data.

Synopsis

Introduction to manufacturing engineering and manufacturing processes. Machining processes, metal shaping, extrusion, casting and joining. Material removal processes. Planning. Design and practice. Engineering material. Material characteristics and material properties. Heat treatment and material tests.

References

1. Kalpakjian, *Manufacturing Processes for Engineering Materials*, 3rd Edition, Addison Wesley, 1997.
2. Waters T.F., *Fundamentals of Manufacturing for Engineers*, UCL Press, 1996.
3. Beddos & Bibby, *Principles of Metal Manufacturing Processes*, Arnold Publication, 1987.

Instrumentation & Control (DMFD 2433)

Objective

(a) To identify the functional element of measurement systems and describe the operating principle and characteristics of common elements.
(b) To describe and explain the operation of measurement systems used for common engineering measurements
(c) To maintain and use the test engineering measurements systems.
(d) To understand different types of control systems and their different control modes programmable logic controllers and ladder diagrams.

Synopsis

Introduction to measurement and instrumentation. Static characteristic of instruments; accuracy, sensitivity, reproducibility, drift, dead zone, static errors, human errors, systematic errors, and random errors. Estimation of static errors. Dynamic characteristics of instruments. Transducers. Displacement, strain, temperature, pressure and flow measurement. Signal conditioning circuit; Wheatstone bridge circuits, AC bridge. Signal conditioning processes, recovery and conversion. Display and recording devices. Process control and stability.

References

1. Curtis D. Johnson, *Process Control Instrumentation Technology*, 7th Edition, Prentice Hall, 2000.
2. Richard D., *Introduction to Electric Circuits*, 3rd Edition, John Wiley & Sons, 1996.
3. Elgar P., *Sensors for Measurement and Controls*, Longman, 1998.
4. Nise N., *Control System Engineering*, 3rd Edition, John Wiley, 2000.

Metrology (DMFD 2542)

Objectives

(a) To apply the basic knowledge and technique of engineering metrology specifically in dimensional metrology.
(b) To use appropriate measuring equipment for required dimensions by exposing them to various types of measuring equipments.
(c) To use high precision measuring equipments such as CMM and Height Digital Measuring Station) for a basic linear measurement.
(d) To manage data through Statistical Process Control (SPC) method.

Synopsis

Introduction to Metrology, Process Capability Analysis, Limits, Tolerances and Fits, Linear Measurement, Angle Measurement, Comparators, Straightness, Flatness and Squareness, Surface Finish, Recent Trend in Metrology, Report Writing: Project and Lab Report

References

1. Connie D., Roger H., Richard L. T., *Fundamentals of Dimensional Metrology*, Thomson Delmar Learning, 2003.
2. Maran M. R., *Pengenalan Metrologi Dimensi*, Penerbit Universiti Sains Malaysia, 1998.
3. Cintakindi, S. R. and Ganpule, S.S, *A Textbook of Metrology and Quality Control*, Shah Lunawat's Technova Publishing House, 2000.

Design Project (DMFD 3823)

Objectives

(a) To use knowledge and skills gained to produce project design individually or in-group.
(b) To construct prototype using appropriate manufacturing process.
(c) To produce concise and complete technical report covering each stage of project implementation.
(d) To perform presentation in a seminar to explain the project and be able to answer questions from the panel or audients.
(e) To display design project with attractive posters in an exhibition for public viewing.

Synopsis

Students are required to design a product from scratch and produce the complete prototype at the end of the course. Their activities will be monitored and guided by supervisors assigned by the faculty. The activities include project determination and selection, project planning, project implementation, report writing, project presentation and project display.

Fluid Power (DMFD 3413)

Objectives

(a) To understand the underlying theoretical concepts and state the importance, applications, advantages and disadvantages of fluid power systems.
(b) To familiar and understand the construction, working principles and applications of various types of fluid power components.
(c) To know how the componenets are selected and integrated into a system and understand the sizing and applications of different types of actuators.
(d) To understand the operation of basic circuits and know how to read basic schematics

Synopsis

The study of pneumatics and hydraulics is called fluid power. Overview of fluid power system is done prior to detailing sections in hydraulics and pneumatics respectively. For hydraulics, topics include pressure control, creation and control of fluid flow, rotary actuators, temperature and contamination control. For pneumatics, topics include orifice equation, compressors, receivers, pipelines, preparation of compressed air, cylinders, motors, additional actuator units, valves and standard conditions. An understanding of the theoretical concepts is achieved through easy-to-understand explanations and numerous examples.

References

1. Anthony Esposito, *Fluid Power with Application*, 6th Edition. Prentice Hall, 2003.
2. John S. Cundiff, *Fluid Power Circuits and Controls*, CRC Press, 2002
3. Reeves, William W., *Technology of Fluid Power*, 3rd Edition, Wesley, 1987.
4. Sullivan, James A., *Fluid Power – Theory and Applications*, Prentice Hall, 1996

Manufacturing Management (DMFD 3513)

Objectives

(a) To understand the principles of Production and Operation Management.
(b) To identify and apply management tools in solving management issues.
(c) To manage and supervise the activities in manufacturing environment.

Synopsis

Introduction to the Principles of Scientific and Systematic Management Technique. Linear Programming. Product Costing. Scheduling. Work Methodology. Plant arrangement and location. Inventory Control. Quality Control. Maintenance. Industrial Safety

References

1. Richard , T. J., *Production/Operation Management Concepts, Structure and Analysis*, 2nd Edition, 1985.
2. Adam, E. E. & Ebert, R.J., *Production and Operation Management Concepts, Models and Behavior*, 3rd Edition, Prentice-Hall, 1986.
3. Tersine R. J., *Production Operation Management Concepts*, 2nd Edition, 1985.

CAD/CAM (DMFD 3122)

Objectives

(a) To use and familiar with CAD/CAM software for sketching 2D elements and geometric modeling.
(b) To generate machining strategies and method for tool path.
(c) To simulate the part program before the actual machining process.
(d) To transfer the NC part programming to the machine control.
(e) To use and physically familiar with CNC Milling

Synopsis

This course is an introducing to the CAD/CAM system and its application. The students will be exposed to the application of high-end CAD/CAM software for generating geometric modeling and also part programming. Basically the topics covered are generating 2D Graphic Elements, Geometric Modeling Systems, Generative/ Interactive Drafting, CAD and CAM Integration, CAD/CAM Programming and Introduction to CIM. By doing a group project, student will understand the link from CAD to CAM operation. In CAD/CAM software also, the students will know how to simulate the part programming before start the machining operation.

References

1. P. N. Rao, CAD/CAM Principles and Applications, McGraw Hill, 2002.
2. Lee, Kunwoo, Principles of CAD/CAM/CAE System, Addison Wesley, Longman Inc., 1999.
3. McMahon, Chris, Browne, Jimmie, CAD/CAM: Principles, Practice and Manufacturing Management, 2nd Edition, Prentice Hall, 1998.

CNC Technology (DMFD 3333)

Objectives

(a) To expose and learned about the CNC System.
(b) To produce a product by using a computer-controlled machine.
(c) To give order in programming code to machine and create a product modeling

Synopsis

Introduction and definition of CNC. The Difference between conventional machines and CNC machine. The Advantages of CNC machine. 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 machine.

References

1. Peter Smid, *CNC Programming Handbook*, 1st Edition, 2000.
2. Steve Krar, Arthur Gill & Peter Smid, Computer Numerical Control Simplified, 1st Edition, 2001.
3. Stenerson, *CNC Operation and Programming*, Prentice Hall, 1997.

Engineering Economy (DMFD 3543)

Objectives

(a) To understand the benefits of engineering in economics aspects.
(b) To understand the basic concepts in economic equivalence, inflation and effects on cash flow.
(c) To be able to apply knowledge of engineering economy such as elements of operational value analysis, fix cost, variable cost and production cost.
(d) To produce the basic idea of project evaluation, depreciation and tax implication.

Synopsis

Basically, Engineering Economy covers Introduction to the subject of Engineering Economy highlight thing the differences between Engineering and Engineering Economy. Further the concept of Economy and Cost is covered which explains the elements of Fix Cost, Variable Cost and Production Cost. The subject also covers the Interest System and Inflation System and the topics of analysis and value of production operation are introduced. Brief introduction to project evaluation, depreciation and tax implication are given.

References

1. H.G Thuesen, W.J Fabrycky, G.J Thuesen, *Ekonomi Kejuruteraan*, DBP, 1988.
2. Gerald J, Thueses, W.J Fabrycky, *Engineering Economy*, 9th Edition, Prentice Hall, 2001.
3. Chan S. Park, *Contemporary Engineering Economics*, 3rd Edition, Prentice Hall, 2002.

Engineering Material (DMFD 3253)

Objectives

(a) To explain the differences between metal, metal alloy and nonmetal, that is commonly used in many engineering field.
(b) To familiarize the students with the procedure and protocols that is normally employed in the materials selection process.
(c) To introduce the methodology of material selection to be applied in engineering field.

Synopsis

The selection of material and its characteristic. Types of Materials: mild steel, polymer, ceramics and composites. Mechanical Process: The Micro Structure Formation and Control. Elastic Mechanism. Deformation Principles. Material Application in Manufacturing. Material Heat Treatment. The Impact to Manufacturing Process.

References

1. Kenneth G. Budinski & Michael K. Budinski, Engineering Materials, 6th Edition, John Wiley & Sons, 1999.
2. Ashby M.F. & Jones D.R.H., Engineering Materials 2, 2nd Edition, Heinemann, 1998.
3. Calister W.D. Jr., Material Science and Engineering: An Introduction, 6th Ed. John Wiley and Sons, 2002.

Robotics Dan Automation (DMFD 3463)

Objectives

(a) To give the exposure and the basic knowledge to students of robotic and industry automation.
(b) To identify the type of robots, robot application and industrial control system.
(c) To familiarize with control programming.

Synopsis

Introduction to Robotics. Basic Principle of Robot Technology. Flashing System. Mechanic System such as components, dynamics and modeling. Robot application and programming. Robots Future. Industrial Control System such as Programmable Logistic Control (PLC), Electric Ladder diagram, Pneumatic Control Circuit, Flexible Automation - programmable Controls

References

1. Michael A. Salant, Introduction To Robotics, 1st Edition, Prentice Hall, 1986.
2. Mikel P. Groover, Mitchell Weiss, Roger N. Nagel & Nicholas G. Odery, Industrial Robotics, 2nd Edition, McGraw Hill, 1986.
3. G. Mair., *Industrial Robotics*, Prentice-Hall, 1988.

Manufacturing Information Technology (DITG 3113)

Objectives

(a) To expose students on the understanding and confidence in computer usage for data and information entry in the latest network era.

Synopsis

Introduction of this course consists of basic principles of computer system especially pertain to the computer programming, software development methodology and life cycle. The programming parts include the basic programming principles (e.g.: syntax, semantic, compiling and linking). Also include are methods for problem solving, data type, dynamic and abstract data. Advance chapters such as repetition, function and array are learnt towards the end of this course. Tools for the practical works of this course is Microsoft Visual C++. Network.

References

1. Shaw, Michael, Information-Based Manufacturing With The Web, Kluwer Academic Publishers Massachusetts, 2001
2. Irv Englander, The Architecture of Computer Hardware and System Software: An Information Technology Approach, 3rd Edition, John Wiley & Sons, 2003.
3. Franjo Cecelja, Manufacturing Information and Data Systems Analysis, Design and Practice, Kogan Page Science, 2002.
4. Pako Raymond, *Business Data Communication & Networking: A Modular Approach*, 2nd Edition, Prentice-Hall, 1999.

Quality Control (DMFD 3582)

Objectives

(a) To provide an introduction to the fundamental basic concepts of Quality, Quality Control and Quality Guru's.

(b) To enhance their knowledge by some advanced topics like ISO 9001:2000, Total Quality Management (TQM), Failure Mode and Effect Analysis (FMEA), Quality Function Deployment (QFD) and Six Sigma.

(c) To understand the fundamental of Statistics and Probability.

(d) To know the problem solving methods in Statistical Quality Control (SQC) and Statistical Process Control (SPC).

Synopsis

This subject covers principles and practices, tools and techniques, fundamentals of statistics, control charts for variables, additional SPC techniques variables, fundamentals of probability, control charts for attributes, lot-by-lot acceptance sampling by attributes, acceptance sampling systems, Quality Functions Deployments, Total Quality Management (TQM), Six Sigma and also non quantitative techniques such as ISO 9001 : 2000 and Management Tools.

References

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4. Douglas C. Montgomery, Introduction to Statistical Quality Control, 5th Edition, John Wiley and Sons, Inc., 2005

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10. LABORATORY FACILITIES

The Faculty has developed laboratories suitable with subjects offered for the courses. Through these laboratories, students will be exposed with 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. Laboratories developed so far are as below;

1. Machine Shop Laboratory (MCS)
2. Welding Laboratory (WEL)
3. Metal Fabrication Laboratory (FAB)
4. Fitting Laboratory (FIT)
5. Casting Laboratory (CST)
6. Engineering Graphic Laboratory (EGL)
7. Industrial Engineering Laboratory (IEL)
8. Manufacturing Design Laboratory (MDL)
9. Metrology Laboratory (MET)
10. Fluid Power Laboratory (FPO)
11. Engineering Manufacturing Laboratory (EML)
12. Basic Mechanic Laboratory (BML)
13. Computer Numerical Control Laboratory (CNC)
14. CAD/CAM Laboratory (CAM)
15. Ergonomic Laboratory (ERG)
16. Polymer Laboratory (POL)
17. Rapid Prototyping Laboratory (RPL)
18. Robotic Laboratory (ROB)
19. Industrial Automation Laboratory (IAL)
20. Mould & Die Laboratory (MAD)

11. QUALITY ASSURANCE SYSTEM

11.1 MS ISO 9001:2000

The University was presented the MS ISO 9001:2000 Quality System Certificate in Mac 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. We believe the ISO 9001:2000 Certificate is actually more than a certificate, it is the basis of how KUTKM operates.

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