UTHM
Universiti Tun Hussein Onn Malaysia

ACADEMIC PROFORMA 2022/2023

BACHELOR OF MECHANICAL ENGINEERING WITH HONOURS

Universiti Tun Hussein Onn Malaysia
Is Rated as a Five-Star Institution

Global Technopreneur University 2030

FACULTY OF
MECHANICAL & MANUFACTURING ENGINEERING
Universiti Tun Hussein Onn Malaysia
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Universiti Tun Hussein Onn Malaysia
September 2022

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Foreword from Vice Chancellor

Assalammualaikum Warahmatullahi Wabarakatuh and greetings.

I would like to congratulate and welcome all students who will embark on the next important chapter of your life here at UTHM. We appreciate your trust for choosing to be with UTHM in continuing your endeavours to build your future.

The Coronavirus Disease 2019 (Covid-19) pandemic has in the past few years denied new and current students the opportunity to experience higher education within the campus environment. Thankfully, the innovation of vaccines has given us a ray of hope and has now allowed us the opportunity to do what we do best, that is educating the young and bright minds like you.

I would like to highlight that UTHM has set four main pillars in order become a global technopreneur university. These are Edu-Train, Technopreneur, UTHM Prihatin and Governance. At the heart of these pillars are the students and staff who will be the driving force for success. As students of this wonderful institution, it is my hope that you will participate and contribute to the mission of the university and the society at large.

UTHM will continue to strive in providing the best learning experience for its students. Academic programmes are continuously reviewed to ensure that the most recent educational initiatives are implemented. This is in line with the aspirations of the Ministry of Higher Education Malaysia in transforming learning and teaching process to be more flexible, organic, dynamic and effective. Additionally, initiatives such as High Impact Educational Practices (HIEPs), Future Ready Curriculum (FRC), Entrepreneurship Integrated Education (EIE) will take centre stage and shape the academic curriculum, which will increase the Graduate Employability (GE). These initiatives, coupled with dedicated academics and world class facilities will produce holistic graduates and future professionals, as promised in our tagline, “UTHM Produces Professionals”.

On a final note, I would like to again welcome all students to our big family. I believe that you will become successful university graduates and will continue the university tradition of academic excellence. I am also confident that you will be able to apply knowledge and skills gained for the benefit of the society.

Best wishes.

Y. BHG. PROFESSOR TS. DR. RUZAIRI BIN ABDUL RAHIM
Vice Chancellor
Universiti Tun Hussein Onn Malaysia

Foreword from Deputy Vice Chancellor (Academic and International)

Assalammualaikum Warahmatullahi Wabarakatuh and greetings.

I would like to take this opportunity to congratulate and welcome all new students of the academic session 2021/2022 to Universiti Tun Hussein Onn Malaysia (UTHM). Similarly, my congratulations to the Centre for Academic Development and Training for successfully publishing this proforma which is used as a guide for the students to plan their learning journey at the university.

As everyone is aware, the Covid-19 pandemic has continued to change Malaysia's higher education landscape. All universities must adjust to the new norm which affects the learning and teaching process. Students and lecturers are left with no other options than to continue with online classes. Thus, UTHM will continue to ensure quality education through innovative delivery and world class facilities so that no student will be left behind.

Apart from the above, the higher education approach in Malaysia has evolved from teacher-cantered to student-cantered learning. In addition, many initiatives have been rolled out towards the development of holistic and balanced graduates in terms of ethic, moral, knowledge, and skills. In order to improve the quality of learning and teaching, Industry Revolution 4.0 and work-based learning elements are embedded into the curriculum to ensure that academic programmes offered by UTHM continue to be relevant to the needs of current industry and market. Apart from that, knowledge and experience sharing between the key players of local and foreign industries in relation to industries and students as well as local community are delivered through CEO@Faculty programs.

UTHM with much effort and dedication will strive to become the champion of TVET. The existing academic programmes are aligned towards producing excellent TVET graduates. New programmes are developed to cater for new areas in TVET, which are seen to be the dominant workforce in Malaysia. It is hoped that all these efforts will further accelerate UTHM in becoming a global technopreneur university.

I do hope that all the initiatives which have been and will be rolled out by UTHM will give you valuable experiences in gaining valuable knowledge and skills at UTHM. I would like to call out on you to take the opportunity to explore your own potential through various co-curricular activities and programmes prepared by UTHM. To achieve these aspirations, early preparations guided by this proforma will help you plan for your journey throughout your studies at UTHM. I hope you will be able to achieve excellent academic results and outstanding success.

Finally, I wish you all the best and pray that you will be successful in your studies at the university and be able to contribute to the development of the religion, race and nation.

"WITH WISDOM WE EXPLORE"

PROFESSOR DR. AZME BIN KHAMIS
Deputy Vice Chancellor (Academic and International)
Universiti Tun Hussein Onn Malaysia

Foreword from the Dean of Faculty of Mechanical and Manufacturing Engineering

Assalamualaikum Warahmatullahi Wabarakatuh and Greetings

I would like to congratulate you as a new member of the Faculty of Mechanical and Manufacturing Engineering (FKMP), UTHM for the 2021/22 academic session. You are fortunate to be chosen among other applicants who have applied to the University. In fact, you are already a student at this University, compared with many other friends who are still looking for opportunity to further their studies. Thus, you should be aware that this is an honour that should not be taken for granted. This is an opportunity in extending the efforts that require undivided attention for students to seek knowledge and be the best.

In line with the University's mission to produce and train professionals and technologists with competitive and noble attitude, students will be guided by professional and dedicated lecturers. Programmes offered by FKMP will satisfy the core of mechanical and manufacturing engineering by focusing on specific areas such as mechanics, energy and thermofluids, manufacturing and industrial technologies, materials and design, as well as aeronautical engineering technology. To enhance students' understanding and creativity, the faculty's laboratories and learning facilities are equipped with the latest technology and well-trained personnel. Students will also undergo practical work in the field related to the needs of industry.

Therefore, students should take this opportunity to work hard to fulfil the expectation from parents, industry and nation. Systematic planning together with careful preparation during the study will produce excellent graduates.

Best regards,

Associate Professor Ir. Ts. Dr. Bukhari bin Manshoor
Dean
Faculty of Mechanical and Manufacturing Engineering
Universiti Tun Hussein Onn Malaysia

Vision

Towards a world class university in engineering, science and technology for sustainable development.

Mission

UTHM is committed to generate and disseminate knowledge, to meet the needs of industry and community and nurturing creative and innovative human capital, based on the *tauhidic* paradigm.

Education Philosophy of University

The education and training practice in this university is a continuous effort to become the leader in market oriented academic programmes. These programmes are student-focused and are conducted through experiential learning in order to produce well trained human resource and professionals who are catalysts for sustainable development.

Logo of University

The logo of UTHM displays a proton, a book, a tiered mortar board (levels of learning), a book-rest and a shield.

Symbolism:

- Red — Bravery
- Blue — Collaboration
- Silver — Quality/ Prestige
- Book-rest — Knowledge
- Proton — Science and Technology
- Book — Knowledge
- Mortar board — Levels of study
- Circle — Resilient and related to global characteristics
- Shield — Confidence

The whole concept of the logo represents UTHM as a learning institution that supports knowledge expansion and development at all levels of study in science and technology.

Blue represents the close relationship among UTHM community in ensuring successful and resilient implementations of the University programmes as well as its education and research activities that are carried out for the benefit of mankind.

Red symbolises the adventurous nature of UTHM in exploring new fields to establish itself as a leader in the applications of science and technology. Thus, this reflects the spirit and self-esteem of the UTHM community.

Chancellor

HIS ROYAL HIGHNESS TUNKU MAHKOTA ISMAIL IBNI SULTAN IBRAHIM
Regent of Johor

Pro Chancellor I

Pro Chancellor II

Board of Directors of University

Chairman

YBhg. Dato' Sri Ibrahim bin Ahmad

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YBhg. Prof. Ts. Dr. Ruzairi bin Abdul Rahim
Vice Chancellor, Universiti Tun Hussein Onn Malaysia

YB. Dato' (Dr.) Haji Nooh bin Gadot
Advisor, Johor Islamic Religious Council

YBhg. Dato' Dr. Mohd. Padzil bin Hashim
Putra Business School, Universiti Putra Malaysia (UPM)

YBhg. Dato' Ir. Dr. Haji Abdul Rashid bin Maidin
Managing Director, Pusat Bertauliah Akademik Profesional Koperasi Serbaguna Anak-anak Selangor Berhad (KOSAS)

YBrs. Dr. Sharifah Adlina binti Syed Abdullah
Ministry of Finance Malaysia

YBrs. Mr. Shahril Anwar Mohd Yunos
Managing Partner, Virtus Capital Partners Sdn Bhd

YBrs. Ts. Zainab binti Ahmad
Director General, Polytechnic and Community College Education Department, Ministry of Higher Education

YBrs. Prof. Dr. Yusri bin Yusof
Professor, Universiti Tun Hussein Onn Malaysia

YBrs. Mdm Elain Lockman
Chief Executive Officer and Co-founder
Ata Plus Sdn. Bhd.

Secretary

En. Abdul Halim bin Abdul Rahman
Registrar/Chief Operating Officer (COO)
Universiti Tun Hussein Onn Malaysia

Members of Senate

Chairman

YBhg. Prof. Ts. Dr. Ruzairi bin Abdul Rahim
Vice Chancellor, Universiti Tun Hussein Onn Malaysia

Members

Prof. Ts. Dr. Azme bin Khamis
Deputy Vice Chancellor (Academic and International)

Prof. Dr. Mohd Shahir Shamsir Bin Omar
Deputy Vice Chancellor (Research and Innovation)

Prof. Sr. Ts. Dr. Lokman Hakim bin Ismail
Deputy Vice Chancellor (Student Affairs and Alumni)

Assoc. Prof. Ts. Dr. Mohd Kamarulzaki bin Mustafa
Provost UTHM Pagoh Campus

Prof. Ir. Dr. Md Saidin bin Wahab
Assistant Vice Chancellor / Chief Digital Officer (CD) (Digital and Infrastructure)

Assoc. Prof. Dr. Mas Fawzi bin Mohd Ali
Assistant Vice Chancellor (Strategic and Quality)

Prof. Dr. Shahruddin bin Mahzan @ Mohd Zin
Dean, Centre for Graduate Studies

Prof. Ir. Ts. Dr. Mohd Irwan bin Juki
Dean, Faculty of Civil Engineering and Built Environment

Assoc. Prof. Dr. Rosli bin Omar
Dean, Faculty of Electrical and Electronic Engineering

Assoc. Prof. Ir. Ts. Dr Bukhari bin Manshor
Dean, Faculty of Mechanical and Manufacturing Engineering

Prof. Dr. Wan Fauzi@Fauziah binti Wan Yusoff
Dean, Faculty of Technology Management and Business

Assoc. Prof. Ts. Dr. Abdul Rasid bin Abdul Razzaq
Dean, Faculty of Technical and Vocational Education

Ts. Dr. Azizul Azhar bin Ramli
Dean, Faculty of Computer Science and Information Technology

Assoc. Prof. Dr. Mohamad Zaky bin Noh
Dean, Faculty of Applied Sciences and Technology

Assoc. Prof. Ts. Dr. Jumadi bin Abdul Sukor
Dean, Faculty of Engineering Technology

Ts. Dr Mohd Shahir bin Yahya
Dean, Centre for Diploma Studies

Dr. Lutfan bin Jaes
Dean, Centre for General Studies and Co-curricular

Dr. Hj. Azmi bin Abdul Latiff
Dean, Centre for Language Studies

Prof. Dr. Erween bin Abdul Rahim
Director, Centre for Academic Development and Excellence

Assoc. Prof. Ts. Dr. Razali bin Hassan
Director, Malaysia Research Institute for Vocational Education and Training

Assoc. Prof. Dr. Amran bin Harun
Institute for Social Transformation and Regional Development

Prof. Ts. Dr. Aeslina binti Abdul Kadir
Faculty of Civil Engineering and Built Environment

Prof. Ts. Norzila binti Othman
Faculty of Civil Engineering and Built Environment

Prof. Dr. Mohammad Faiz Liew bin Abdullah
Faculty of Electrical and Electronic Engineering

Prof. Dr. Nafarizal bin Nayan
Faculty of Electrical and Electronic Engineering

Prof. Dr. Yusri bin Yusof
Faculty of Mechanical and Manufacturing Engineering

Prof. Dr. Zawati binti Harun
Faculty of Mechanical and Manufacturing Engineering

Prof. Dr. Abdul Talib bin Bon
Faculty of Technology Management and Business

Prof. Sr. Dr. Wan Zahari bin Wan Yusof
Faculty of Technology and Business

Prof. Ts. Dr. Alina binti Shamsuddin
Faculty of Technology Management and Business

Prof. Ts. Dr. Ishak bin Baba
Faculty of Technical and Vocational Education

Prof. Dr. Rosziati binti Ibrahim
Faculty of Computer Science and Information Technology

Prof. Dr. Rozaida binti Ghazali
Faculty of Computer Science and Information Technology

Prof. Ts. Dr. Zaidi bin Embong
Faculty of Applied Sciences and Technology

Prof. Dr. Abdul Mutalib bin Leman
Faculty of Engineering Technology

Prof. Ts. Dr. Amir bin Khalid
Faculty of Engineering Technology

Prof Dr. Chan Chee Ming
Faculty of Engineering Technology

Ir. Ts. Dr. Raha binti Abd Rahman
Industry Fellow

Prof. Dr. Nazri bin Mohd Nawi
Director, Information Technology Centre

En. Abdul Halim bin Abdul Rahman
Registrar/Chief Operating Officer (COO) / Senate Secretary

Mr Norzaimi bin Hamisan
Bursar / Chief Financial Officer (CFO)

Mdm. Zaharah binti Abd Samad
Chief Librarian

Mdm. Norliah binti Yaakub
Legal Advisor

Faculty of Mechanical and Manufacturing Engineering

Faculty Vision

To lead the application of science and technology in mechanical and manufacturing engineering for universal prosperity

Faculty Mission

Producing and train responsible, competent, creative and innovative professionals in the field of Mechanical and Manufacturing Engineering, through world-class academic programmes

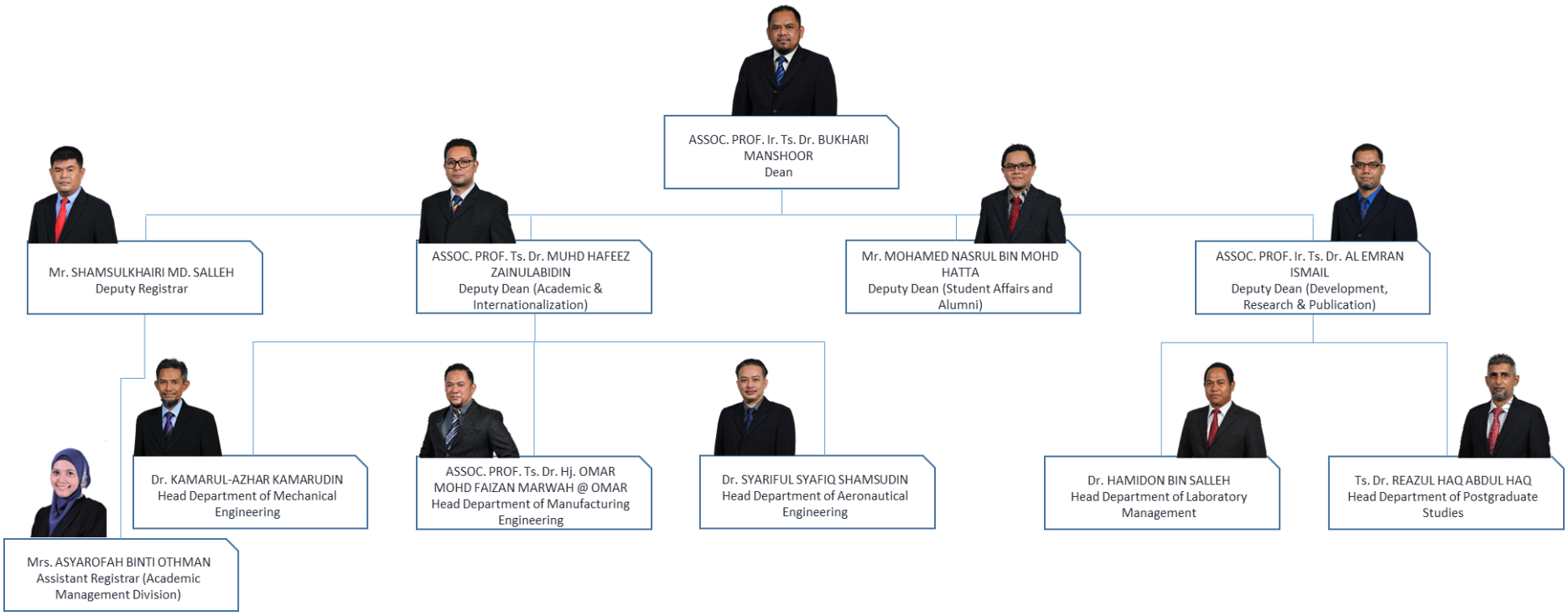
Faculty Background

Faculty of Mechanical and Manufacturing Engineering (FKMP) in Universiti Tun Hussein Onn Malaysia (UTHM) was established on 1 May 2004 since the restructuring of Faculty of Engineering and Faculty of Technology Engineering. The faculty aims are to provide competitive academic programmes to produce technologists and professionals for national and global needs, to be a centre for reference, research and consultation through smart partnerships with industries and stakeholders and to nurture life-long learning as a culture among graduates, staff and the society.

The faculty is always aware of the current technological development to fulfil the requirement by Board of Engineers, Malaysia (BEM) and Institution of Engineers, Malaysia (IEM). The academic programmes offered by FKMP is monitored and advised by local and worldwide the external examiners and experts. The programmes are approved and recognized by the Public Service Department of Malaysia (JPA).

Faculty of Mechanical & Manufacturing Engineering

Organizational Chart



Faculty Adjunct Professor(s)

Ts. Shamsul Kamar bin Abu Samah
National Aerospace Coordinating Office (NAICO)

Faculty Visiting Professor

Prof. Dr.-Ing. Jörg Manfred Hoffman
Hochschule Osnabrück University of Applied Sciences

Faculty External Examiner(s)

Prof. Ir. Dr. Ramesh Singh a/l Kuldip Singh
Universiti Malaya

Prof. Ir. Dr. Abd. Rahim bin Abu Talib
Universiti Putra Malaysia

Prof. Ir. Dr. Ahmad Razlan bin Yusoff
Universiti Malaysia Pahang

Faculty Industrial Advisor(s)

Ir. Zaismadi bin Ismail
Honda Malaysia Sdn Bhd

Mr. Redzuan bin Rustam
Proton Tg Malim Sdn Bhd

Mr. Mohd. Shazlan bin Mohd. Anwar
Virtual Instruments & System Innovation (VISI) Sdn Bhd

Ts. Jeffry bin Jamil
Advantech Alliance Sdn Bhd

Mr. Muhamad Sharan bin Musa
Synthomer Sdn Bhd

Mr. Fong Kok Weng
Orca Creation Sdn Bhd

Mr. Mohd.Salahuddin bin Abdul Majid
MTBE Malaysia Sdn Bhd

Mr. Razaman bin Maydin
RZF Engineering Services Sdn Bhd

Mdm. Azizah binti Kassim
Green 3 Sdn Bhd

Mr. Fareza Fazidi bin Fazi
Serba Dinamik Holdings Berhad

Capt. Cyrano Latiff
Airasia (Malaysia)

Mr. Mohd. Suhaimi bin Mokhtar
Civil Aviation Authority of Malaysia (CAAM)

Ts. Liew Chee Leong
SR Aviation Sdn Bhd

Mr. Mohd. Khairi bin Rahim
CTRM Aero Composites Sdn Bhd

Mr. Luqman Hakim bin Baharudin
Spirit AeroSystems Malaysia Sdn Bhd

Mr. Shaharizal bin Hj. Ariffadillah
Aerospace Composites Malaysia Sdn Bhd

Faculty Staff Directory

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Associate Prof. Ir. Ts. Dr. Bukhari bin Manshoor
Ph.D (Mechanical Engineering) (University of Sheffield), MEng. (Mechanical Engineering) (UTM), B.Eng. (Mechanical Engineering) (UiTM)

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Associate Prof. Ts. Dr. Muhd. Hafeez bin Zainulabidin
Ph.D (Mechanical Engineering) (University of Strathclyde), B.Eng. (Hons.) (Mechanical Engineering) (UMIST)

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Ph.D (Mechanical Engineering) (UKM), M.Eng. (Mechanical Engineering) (UiTM), B.Eng (Mechanical Engineering) (UPM)

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Ph.D (Manufacturing Engineering)(Brunel University), B.Eng (Manufacturing) (Leeds Metro Uni.), Dip. (Mechanical) (GMI)

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B. Public Management (Hons.) (UUM)

Assistant Registrar
Mrs. Asyarofah binti Othman
B. Business Administration (Marketing) (UiTM)

Administration Staff
Mrs. Haslina binti Abd. Rashid
Mrs. Hanita binti Basri
Mr. Razif bin Salim
Ms. Norlaili binti Ismail
Mrs. Ruzaimah binti Kamat
Mrs. Azlin binti Masah
Mr. Abd Aziz bin Hashim
Mr. Abdul Hadi bin Mohamed Zainal
Mrs. Ummu Hani binti Ismail
Mr. Norhuda bin Bunawar
Ms. Noor Syafiqah binti Sammuri

Department of Mechanical Engineering

Head of Department

Dr. Hj. Kamarul-Azhar bin Kamarudin
Ph.D (Mechanical Engineering) (The University of Manchester), M.Eng. (Mechanical Engineering) (UTM), BEng. (Aerospace) (UPM), Dip. (Mechanical Engineering) (Politeknik Port Dickson), Cert. (Mechanical Engineering) (Politeknik Port Dickson)

Academic Staff

Professor Dr. Shahruddin bin Mahzan @ Mohd Zin
Ph.D (Mechanical Eng.) (University of Sheffield), B.Eng (Hons.) (Mekanikal & Bahan)(UKM)

Prof. Dr. Mas Fawzi bin Mohd Ali
Dr. Eng. (Earth and Life Environmental Engineering) (The University of Tokushima), M.Eng. (Mechanical Engineering) (UTM), B.Eng (Hons) (Electromechanical System Engineering) (UMIST)

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B.Eng. (Mechanical) (KUiTTHO)

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Bachelor in Mathematic (USM)

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Dr. Abdulhafid M A Elfaghi
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PhD. (Mechanical Engineering.) (Iwate University), M. Eng. (Mechanical) (Iwate University), B.Eng. (Mechanical) (Iwate University), Dip. (Mechanical Engineering) (Oyama National College of Technology)

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Ph.D., MEng. (Mechanical Engineering) (UTHM), BEng. (Mechanical Engineering) (University of Plymouth), Dip. (Aeronautical) (UTM)

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Ph.D (Eng. Design) (UTM), M.Eng. (Mech. Eng.) (UTHM), BEng. (Hons.) (Mech. Eng.) (KUiTTHO)

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BEng. (Mechanical System) (Uni. Of Tokushoku)

Dr. Ramhuzaini bin Abd Rahman
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Programme Name
Bachelor of Mechanical Engineering with Honours

Programme Aims

1. To provide competitive academic programmes to produce professional engineers for national and global needs;
2. To be a centre for reference, research and consultation through smart partnership with industries and stakeholders;
3. To nurture life long learning as a culture among graduates, staff and society.

Programme Educational Objectives (PEOs)

These are the PEOs for Bachelor of Mechanical Engineering with Honours programme

Programme Educational Objectives (PEO): The Faculty has underlined the following long-term objectives for its programmes to produce a mechanical engineer that:		
PEO1	*Attained the level of professional engineers or senior engineer.*	1, 2, 8, 10, 13
PEO2	*Hold management or decision-making position.*	3, 4, 5, 9, 11
PEO3	*Lead entrepreneurial efforts in accordance with national needs and demands.*	7
PEO4	*Have strong commitment for self-learning and continuous professional development.*	6,12

Programme Learning Outcomes (PLOs)

These are the PLOs for Bachelor of Mechanical and Manufacturing Engineering with Honours

Programme Learning Outcomes (PLOs): Upon completion of the course, the students are expected to attain the following:

PLO1	*Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialisation respectively to the solution of complex engineering problems.*	*(KPT1-Knowledge-K)*
PLO2	*Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.*	*(KPT2-Practical Skill - PS)*
PLO3	*Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.*	*(KPT3 – Communication - CS)*
PLO4	*Conduct investigation of complex engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.*	*(KPT4 – Critical Thinking, Problem Solving - CTPS)*
PLO5	*Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.*	*(KPT5 – Team Work - TS)*
PLO6	*Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.*	*(KPT6 - Life Learning and Information Management - LLL)*
PLO7	*Recognise the importance of entrepreneurship in Mech. Eng. and its' related discipline.*	*(KPT7 – Entrepreneurship-ES)*
PLO8	*Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.*	*(KPT8 – Morale, Professional and Ethics - EMP)*

PLO9	*Demonstrate knowledge and understanding of engineering management principles and economic decision making and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.*	*(KPT9 – Leadership-LS)*
PLO10	*Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.*	*(EAC 3 - Design)*
PLO11	*Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.*	*(EAC 4 - Analysis)*
PLO12	*Understand and evaluate the sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts.*	*(EAC 7 - Sustainability)*
PLO13	*Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.*	*(EAC 6 – Engineers and Society)*

Curriculum Structure

Table 1: Curriculum Structure for Bachelor of Mechanical Engineering with Honours

CURRICULUM STRUCTURE
BACHELOR DEGREE OF MECHANICAL ENGINEERING WITH HONOURS
4 YEAR PROGRAM (FKMP)

1st YEAR
1st SEMESTER

COMPONENTS	CODE	COURSES	Meeting Hours / Week			SLT	CREDIT HOURS
			CLASS	TUTORIAL	LAB		
University Courses	BDA 10602	Creativity & Innovation	2	0	0	2	2
	UQI 10102 UQI 10202	Islamic Studies / Moral Studies	2	0	0	2	2
		Total	**4**	**0**	**0**	**4**	**4**
Mathematic Courses							
		Total	**0**	**0**	**0**	**0**	**0**
Faculty Support Courses							
		Total	**0**	**0**	**0**	**0**	**0**
Engineering Core Courses	BDA 10203	Statics	2	2	0	4	3
	BDA 10703	Technical Drawing and CAD	1	0	4	5	3
	BDA 10803	Material Science	2	2	0	4	3
	BDA 17201	Material Science Engineering Laboratory	0	0	2	2	1
	BDA 18201	Mechanical Engineering Workshop I	0	0	2	2	1
		Total	**5**	**4**	**8**	**17**	**11**
Elective Courses							
		Total	**0**	**0**	**0**	**0**	**0**
		OVERALL	**9**	**4**	**8**	**21**	**15**

1st YEAR
2nd SEMESTER

COMPONENTS	CODE	COURSES	Meeting Hours / Week			SLT	CREDIT HOURS
			CLASS	TUTORIAL	LAB		
University Courses	UHB 10100	English for Higher Education	1	2	0	3	2
	UQ* 1**01	Co-Curriculum I	0	0	3	3	1
	UQI 11202	Falsafah dan Isu Semasa	2	0	0	2	2
	UWB 1*'02	Foreign Language	1	2	0	3	2
		Total	**4**	**4**	**3**	**11**	**7**
Mathematic Courses	BDA 14403	Calculus For Engineers	2	2	0	4	3
		Total	**2**	**2**	**0**	**4**	**3**
Faculty Support Courses							
		Total	**0**	**0**	**0**	**0**	**0**
Engineering Core Courses	BDA 10903	Solid Mechanics I	2	2	0	4	3
	BDA 14303	Electric and Electronic Technology	2	2	0	4	3
	BDA 17301	Mechanics Engineering Laboratory I	0	0	2	2	1
	BDA 18301	Mechanical Engineering Workshop II	0	0	2	2	1
		Total	**4**	**4**	**4**	**12**	**8**
Elective Courses							
		Total	**0**	**0**	**0**		**0**
		OVERALL	**10**	**10**	**7**	**27**	**18**

2nd YEAR
1st SEMESTER

COMPONENTS	CODE	COURSES	Meeting Hours / Week			SLT	CREDIT HOURS
			CLASS	TUTORIAL	LAB		
	UQ` 1**01	Co-Curriculum II	0	0	3	3	1
	UQU 10103 UQU 10303	Nationhood & Current Develop't of Malaysia / Malaysia Studies and Culture	3	0	0	3	3
		Total	**3**	**0**	**3**	**6**	**4**
Mathematic Courses	BDA 24303	Differential Equations	2	2	0	4	3
		Total	**2**	**2**	**0**	**4**	**3**
Faculty Support Courses	BDA 24202	Computer Programming	1	0	2	3	2
		Total	**1**	**0**	**2**	**3**	**2**
Engineering Core Courses	BDA 20103	Dynamics	2	2	0	4	3
	BDA 20603	Fluid Mechanics I	2	2	0	4	3
	BDA 20703	Thermodynamics I	2	2	0	4	3
		Total	**6**	**6**	**0**	**12**	**9**
Elective Courses							
		Total	**0**	**0**	**0**	**0**	**0**
		OVERALL	**12**	**8**	**5**	**25**	**18**

2nd YEAR
2nd SEMESTER

COMPONENTS	CODE	COURSES	Meeting Hours / Week			SLT	CREDIT HOURS
			CLASS	TUTORIAL	LAB		
University Courses	UHB 20102	Essential Academic English	1	2	0	3	2
	UWB 11202 UQU 10202	Malay Language Ethnic Relationship /	0	0	0	0	2
		Total	**0**	**0**	**0**	**0**	**4**
Mathematic Courses							
		Total	**0**	**0**	**0**	**0**	**0**
Faculty Support Courses							
		Total	**0**	**0**	**0**	**0**	**0**
Engineering Core Courses	BDA 20303	Mechanics of Machine	2	2	0	4	3
	BDA 20402	Engineering Materials Selection	2	0	0	2	2
	BDA 20903	Solid Mechanics II	2	2	0	4	3
	BDA 30203	Fluid Mechanics II	2	2	0	4	3
	BDA 30403	Thermodynamics II	2	2	0	4	3
		Total	**10**	**8**	**0**	**18**	**14**
Elective Courses							
		Total	**0**	**0**	**0**	**0**	**0**
		OVERALL	**10**	**8**	**0**	**18**	**18**

3rd YEAR
1st SEMESTER

COMPONENTS	CODE	COURSES	Meeting Hours / Week			SLT	CREDIT HOURS
			CLASS	TUTORIAL	LAB		
University Courses							
		Total	**0**	**0**	**0**	**0**	**0**
Mathematic Courses	BDA 34103	Numerical Methods	2	2	0	4	3
		Total	**2**	**2**	**0**	**4**	**3**
Faculty Support Courses	BDA 31302	Occupational Safety and Health (OSH)	2	0	0	2	2
	BDA 41002	Entrepreneurship	2	0	0	2	2
		Total	**4**	**0**	**0**	**4**	**4**
Engineering Core Courses	BDA 30603	Heat Transfer	2	2	0	4	3
	BDA 30703	Control Engineering	2	2	0	4	3
	BDA 30903	Solid Modelling	1	0	4	5	3
	BDA 37401	Mechanics Engineering Laboratory II	0	0	2	2	1
	BDA 37501	Thermofluids Engineering Laboratory	0	0	2	2	1
		Total	**5**	**4**	**8**	**17**	**11**
Elective Courses							
		Total	**0**	**0**	**0**	**0**	**0**
		OVERALL	**11**	**6**	**8**	**25**	**18**

3rd YEAR
2nd SEMESTER

COMPONENTS	CODE	COURSES	Meeting Hours / Week			SLT	CREDIT HOURS
			CLASS	TUTORIAL	LAB		
University Courses	UHB 30102	English for Technical Purposes	1	2	0	3	2
		Total	**1**	**2**	**0**	**3**	**2**
Mathematic Courses	BDA 24103	Engineering Statistics	2	2	0	4	3
		Total	**2**	**2**	**0**	**4**	**3**
Faculty Support Courses	BDA 40902	Engineering Economy	2	0	0	2	2
		Total	**2**	**0**	**0**	**2**	**2**
Engineering Core Courses	BDA 31103	Vibration	2	2	0	4	3
	BDA 31203	Mechanical Component Design	3	0	0	3	3
	BDA 31403	Manufacturing Technology	3	0	0	3	3
	BDA 37601	Mechanics Engineering Laboratory III	0	0	2	2	1
		Total	**8**	**2**	**2**	**12**	**10**
Elective Courses							
		Total	**0**	**0**	**0**	**0**	**0**
		OVERALL	**13**	**6**	**2**	**21**	**17**

3rd YEAR
3rd SEMESTER

COMPONENTS	CODE	COURSES	Meeting Hours / Week			SLT	CREDIT HOURS
			CLASS	TUTORIAL	LAB		
Engineering Core Courses	BDA 38105	Industrial Training	0	0	0	0	5
		(3 months / 10 weeks)					
		Total	**0**	**0**	**0**	**0**	**5**
		OVERALL	**0**	**0**	**0**	**0**	**5**

4th YEAR
1st SEMESTER

COMPONENTS	CODE	COURSES	Meeting Hours / Week			SLT	CREDIT HOURS
			CLASS	TUTORIAL	LAB		
University Courses	UHB 40102	English for Occupational Purposes	1	2	0	3	2
		Total	**1**	**2**	**0**	**3**	**2**
Mathematic Courses							
		Total	**0**	**0**	**0**	**0**	**0**
Faculty Support Courses	BDA 40502	Engineers & Society	2	0	0	2	2
		Total	**2**	**0**	**0**	**2**	**2**
Engineering Core Courses	BDA 31003	Finite Element Method	2	2	0	4	3
	BDA 40703	Industrial Engineering	2	2	0	4	3
	BDA 40804	Integrated Engineering Design	2	0	4	6	4
	BDA 40902	Engineering Economy	2	0	0	2	2
		Total	**8**	**4**	**4**	**16**	**12**
Elective Courses							
		Total	**0**	**0**	**0**	**0**	**0**
		OVERALL	**11**	**6**	**4**	**21**	**16**

4th YEAR
2nd SEMESTER

COMPONENTS	CODE	COURSES	Meeting Hours / Week			SLT	CREDIT HOURS
			CLASS	TUTORIAL	LAB		
University Courses							
		Total	**0**	**0**	**0**	**0**	**0**
Mathematic Courses							
		Total	**0**	**0**	**0**	**0**	**0**
Faculty Support Courses							
		Total	**0**	**0**	**0**	**0**	**0**
Engineering Core Courses	BDA 49104	Bachelor Degree Project II	0	0	4	4	4
		Total	**0**	**0**	**4**	**4**	**4**
Elective Courses	BD* 4'*03	Elective I	2	2	0	4	3
	BD' 4^*03	Elective II	2	2	0	4	3
	BD' 4*'03	Elective III	2	0	2	4	3
		Total	**6**	**4**	**2**	**12**	**9**
		OVERALL	**6**	**4**	**6**	**16**	**13**

Synopsis of University Courses

Year	Sem	Course Code	Courses	Credit	Total
1	I	UHB 10102 UHB 12902	English for Higher Education / English Development and Engagement	2	4
		UWA 10102 UWA 10202	Islamic Studies / Moral Studies	2	
	II	UQ* 1**01	Co-Curriculum I	1	5
		UWA 10302	Islamic and Asian Civilisation	2	
		UWB 1*'02	Foreign Language	2	
2	I	UWS 10103 UWS 10303	Malaysian Nationhood & Current Development / *Malaysia Studies and Culture	3	5
		UHB 20102	Essential Academic English	2	
	II	UWS 10202 UWB 11202	Ethnic Relationship / *Malay Language	2	2
3	I	UQ` 1**01	Co-Curriculum II	1	3
		UHB 30102	English for Technical Purposes	2	
4	I	UHB 40102	English for Occupational Purposes	2	2
Total Overall Credit					**21**

*For international students only

UHB10102 English for Higher Education

Synopsis

This course exposes students to English language learning in higher education and enhances their study skills. Students have opportunities to learn about using technological affordances in listening to lectures, note taking, library and internet research, conducting academic group discussions, preparing and delivering presentations, and writing an academic report. The course also provides opportunities for students to acquire learning skills that facilitate the transition to tertiary education. Aspects of English language oral and written skills that are most relevant to students in their academic work will be reinforced.

References

1. Agosti, M. (2008). Information access through search engines and digital libraries. Berlin: Springer. Z699 .1534 2008
2. Galanes, G. J. (2013). Effective group discussion: Theory and practice (14th Ed.). New York: McGraw-Hill. HM736 .G34 2013
3. Greasley, P. (2011). Doing essays and assignments: Essential tips for students. Thousand Oaks, CA: Sage Publication. LB1047.3 .G73 2011
4. Lim, P. L. (2014). Listening & notetaking skills 2 (4th Ed.). Boston: National Geographic Learning. PEII28 .L55 2014
5. Van Blerkom, D. L. (2005). College reading and study strategies. Belmont, CA: Wadsworth. LB2395.3 .V36 2005
6. Wong, L. (2012). Essential study skills (7th Ed.). Boston, MA: Wadsworth Cengage Learning. LB1049 .W66 2012
7. Zhang, F. (2012). Computer-enhanced and mobile assisted language learning: Emerging issues and trends. Hershey, PA: Information Science Reference. P53 .28 .C65 2012

UHB12902 English Development & Engagement

Synopsis

This course focuses on two productive language skills, specifically writing and speaking. It is designed based on project-based language learning, which facilitates students to use English in a meaningful way through the activities relevant to the project. By the end of the course, students should be able to complete a project in English on topics related to a wide range of real world situations, present and write about the project.

References

1. Chivers, Barbara, and Michael Shoolbred. A Student′s Guide to Presentations: Making your Presentation Count, SAGE Publications, 2007. ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/uthm ebooks/detail.action?docID=420910.
2. Gleeson, K. (2015). How to Vlog: An Essential Guide to Vlogging (Video Blogging). CreateSpace Independent Publishing Platform, US.
3. Weiss, Michael. Presentation Skills: Educate, Inspire and Engage Your Audience, Business Expert Press, 2015. ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/uthm-ebooks/detail.action?docID=4009414.

UWA10602 Islamic Studies

Synopsis

This course explains about Islamic concept as ad-deen. It discusses the study of al-Quran and al-Hadith, Sunnism, schools of Islamic theology, development of schools of Fiqh, principles of muamalat, Islamic Criminal Law, Islamic work ethics, issues in Islamic family law and current issues.

References

1. Harun Din (Dr.) (2001), *Manusia Dan Islam,* cetakan pertama, Kuala Lumpur: Dewan Bahasa dan Pustaka. [BP174. M36 1990]
2. Mustafa Abdul Rahman (1998), *Hadith 40*, Kuala Lumpur: Dewan Pustaka Fajar. [BP135. A2 M87 1998]
3. Ismail Haji Ali, (1995), *Pengertian dan Pegangan Iktikad yang benar: Ahli Sunnah Wal Jamaah:* Kuala Lumpur: Penerbitan al-Hidayah. [BP166.78. P46 1995]
4. Paizah Haji Ismail (1991), *Undang-undang Jenayah Islam*, Kuala Lumpur: Dewan Pustaka Islam, Angkatan Belia Islam Malaysia. [BP144. P35 1991]
5. Mustafa Haji Daud (1989), *Institusi Kekeluargaan Islam,* Kuala Lumpur: Dewan Pustaka dan Bahasa. [BP188.3. F3.M87 1989]

UWA10702 Moral Studies

Synopsis

This course explains on concepts of moral, aspects of moral and its importance in daily lives, Western moral theories and moral values of great religions of the world, moral values in work and current moral issues.

References

1. Mohd Nasir Omar. (2010). *Falsafah Akhlak*, Penerbit Universiti Kebangsaan Malaysia, Bangi. [BJ1291 .M524 2010].
2. Hussain Othman. (2009). *Wacana Asasi Agama dan Sains.* Batu Pahat: Penerbit UTHM. [BL 240.3 H87 2009[a]].
3. Hussain Othman, S.M. Dawilah Al-Edrus, Berhannudin M. Salleh & Abdullah Sulaiman. (2009). *PBL Untuk Pembangunan Komuniti Lestari*. Batu Pahat: Penerbit UTHM. [LB 1027.42 P76 2009a].
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5. Ahmad Khamis. (1999). *Etika Untuk Institusi Pengajian Tinggi*. Kuala Lumpur: Kumpulan Budiman. [LC315.M3 .A35 1999].

UWB10602 French Language

Synopsis

This course is designed for students to learn the basic of French. Students are exposed to the skills of listening, reading, speaking and writing with basic vocabulary, grammar and structure. Students are also exposed to the real daily situations which will help them to communicate using French.

References

1. Booth, Trudie Maria, (2008). French Verbs Tenses. McGraw-Hill. Call no.: [PC 2271, U66 2008].
2. Heminway, Annie, (2008). Complete French Grammar. McGraw-Hill. Call no.: [PC2112, H45 2008].

3. Price, Glanville, (2003). A Comprehensive French Grammar. Blackwell Publishing. Call no.: [PC2112. P74, 2003].
4. Hatier. (2002). Le Nouveau Bescherelle 12,000 French Verbs. English Edition. Paris: Librairie Hatier.
5. Hatier, (1995). Le Nouveau Bescherelle Complete Guide 12 000 French Verbs. Paris: Librairie Hatier.
6. Kaneman-Pougatch, Massia et al, (1997). Méthod de français: Café Crème 1. Paris: Hachette F.L.E.
7. Grégoir, Maïa et al, (1995). Grammaire Progressive du Français avec 500 exercices. Paris: CLE International.
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9. Capelle, Guy et Gidon, Noëlle, (1995). Méthod de français: Le Nouvel Espaces 1. Paris: Hachette F.L.E.
10. French Dictionary (1999). The New Collins Robert 5th Edition. Paris: Harper Collins Publishers.

UWB10902 Mandarin Language

Synopsis

This course is designed for students to learn the basic of Mandarin. Students are exposed to the skills of listening, reading, speaking and writing with basic vocabulary, grammar and structure. Students are also exposed to the real daily situations which will help them to communicate using Mandarin Language.

References

1. Lim Hong Swan, Yeoh Li Cheng, (2010). *Mandarin Made Easy Through English.* Batu Pahat: Penerbit UTHM. [PL1129.E5 .L554 2009 a]
2. Liu Xun (2010). *New Practical Chinese Reader: Textbook*. China: Beijing Language and Culture University Press. [PL1129.E5 .L58 2010]
3. Kang Yuhua (2007). *Conversational Chinese 301:Vol. 2*. China:Beijng Language and Culture University Press. [PL1121.C5 .K364 2007]
4. Liping Jiang (2006). *Experiencing Chinese.* China: Higher Education Press. [PL1129.E5 .T59 2006]
5. Kang Yuhua (2005). *Conversational Chinese 301*. China: Beijing Language and Culture University Press. [PL1121.C5 .K36 2005]

UWB11002 Malay Language

Synopsis

This course is designed for students to learn the basic Malay language. Students are exposed to the skills of listening, reading, speaking, and writing with basic vocabulary, grammar and structure. Students are also exposed to the real daily situations which will help them to communicate using Malay language.

References

1. Ainun Mohd (2011). *Tesaurus Bahasa Melayu*. PTS Professional Publishing. [PL5123 .A364 2011]
2. Kamaruddin Saad (2009). *105 karangan bahasa melayu UPSR*. Minerva Publishing. [PL 5108 KAM 2009]
3. Nik Safiah Karim (2008). *Tatabahasa Dewan*. [DBP. PL5108 .T37 2008 r]
4. Asmah Hj. Omar (1993). Susur Galur Bahasa Melayu. [DBP: KL. PL5127 .A85 1993 N1]

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6. Asmah Hj. Omar (1985). *Kamus Ayat*. Eastview. [PL5091 .A85 1985 rd]

UWB11202 Arabic Language

Synopsis

This course is designed for students to learn the basic of Arabic. Students are exposed to the skills of listening, reading, speaking and writing with basic vocabulary, grammar and structure. Students are also exposed to the real daily situations which will help them to communicate using Arabic.

References

1. Mohd Hisyam Abdul Rahim; Ahmad Sharifuddin Mustapha; Mohd Zain Mubarak (2008). *Bahasa Arab UMR 1312*. Batu Pahat: Penerbit UTHM. [PJ6115 .M445 2008 a]
2. Abu 'Amiir 'Izzat. (2008). *Kamus adik: bahasa Melayu-bahasa Inggeris-bahasa Arab.* Kuala Terengganu: Pustaka Darul Iman. [PJ6640 ABU 2008]
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4. Abdullah, Mustaffa Siti Rohaya Sarnap Siti Sujinah Sarnap. (2006). *Cara mudah belajar Bahasa Arab*. Singapore: Jahabersa. [PJ6106 .A22 2006]
5. Mohd Hisyam bin Abdul Rahim. (2005). *Senang Berbahasa Arab*. Batu Pahat: Penerbit KUiTTHO. [PJ6115 .M44 2005 a]
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7. Fuad Ni'mat. (1973). *Mulakhass qawa'id al-lughatul 'arabiyyah.* Damsyik: Darul Hikmah. [PJ5161 .F62 1973]

UWB10802 Japanese Language

Synopsis

This course is designed for students to learn the basic Japanese language. Students are exposed to the skills of listening, reading, speaking, and writing with basic vocabulary, grammar and structure. Students are also exposed to the real daily situations which will help them to communicate using Japanese language.

References

1. Surie, Network (2010). AE Minna no Nihongo 1-2 Elementary: Translation and Grammatical Notes, Tokyo: 3A Corporation. [PL539.3 .M57 2010]
2. Surie, Network (2010). AE Minna no Nihongo 1-1 Elementary: Main Textbook, Tokyo: 3A Corporation. [TK7885.7 .V44 2000r]
3. Surie, Network (2009). AE Minna no Nihongo 1-1 Elementary: Translation and Grammatical Notes, Tokyo: 3A Corporation. [PL539.3 .M567 2009]
4. Surie, Network (2009). AE Minna no Nihongo 1-2 Elementary: Main Textbook, Tokyo: 3A Corporation. [PL539.3 .M569 2009]
5. Rosmahalil Azrol Abdullah, (2008) : Bahasa Jepun (UMJ 1312): Learning Module (2nd Edition), Batu Pahat. Penerbit UTHM. [PL539.3 .R67 2008a].
6. Surie Network, (2000). Minna no Nihongo: Kaite Oboeru, Tokyo: 3A Corporation. [PL539.3 .M56 2000]
7. M. Rajendran, (1991) Malay Japanese English Dictionary, Petaling Jaya: Pelanduk Publications. [PL5125 .R34 1991rd].
8. Surie Network, (1998). Minna no Nihongo: Main Textbook - Shokyu 1, Tokyo: 3A Corporation. [PL539.3 .M574 1998]

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UWB10702 German Language

Synopsis

This course is designed for students to learn the basic German language. Students are exposed to the skills of listening, reading, speaking, and writing with basic vocabulary, grammar and structure. Students are also exposed to the real daily situations which will help them to communicate using German language.

References

1. Astrid Henschel, (2006). *German Verb Tenses.* New York: McGraw-Hill. [PF3301. H46 2006]
2. Gabriele Kopp, Siegfried Büttner, (2004). *Planet 1: Deutsch für Jugendliche: Kursbuch.* Ismaning: Germany: Hueber Verlag. [PF3129. K664 2004]
3. Gabriele Kopp, Siegfried Büttner, (2004). *Planet 1: Deutsch für Jugendliche: Arbeitsbuch.* Ismaning: Germany: Hueber Verlag. [PF3129. K664 2004]
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5. Robert Di Donato (2004). *Deutsch, Na Klar!* Boston: McGraw-Hill. [PF3112. D36 2004]

UWB11102 Spanish Language

Synopsis

This course is designed for students to learn the basic Japanese language. Students are exposed to the skills of listening, reading, speaking, and writing with basic vocabulary, grammar and structure. Students are also exposed to the real daily situations which will help them to communicate using Japanese language.

References

1. Nurul Sabrina Zan, (2010). *Hola! Hablo español* First Edition Batu Pahat: Penerbit UTHM. [PC4445 .N72 2010a]
2. Salina Husain, (2005). *Vamos a aprender español lengua extranjera* Batu Pahat: Penerbit UTHM. [PC4121 .S24 2005a]
3. Bey, Vivienne (2004). *Spanish verbs drills*. Mc. Graw Hill. [PC4271 .B49 2004]
4. Terrell, Tracy D. (2003). *Dos mundos*. Mc. Graw Hill. [PC4129.E5 .D67 2003]
5. O'Connor, Niobe (2002). *Caminos 1.* Nelson Thornes. [PC4121 .O36 2002]
6. Vox modern Spanish and English dictionary: English-Spanish/Spanish-English (1986) National Textbook. Co. XX(131882.1)

UWB11302 Javanese Language

Synopsis

This course is designed for students to learn the basic Javanese language. Students are exposed to the skills of listening, reading, speaking, and writing with basic vocabulary, grammar and structure. Students are also exposed to the real daily situations which will help them to communicate using Javanese language.

References

1. Purwanto, Eko (2011). Pepah Bahasa Jawi. Cara mudah belajar cepat dan tuntas bahasa Jawa. Diva press. XX(131748.1)
2. Majendra, Maheswara (2010). *Kamus lengkap Indonesia-Jawa, Jawa-Indonesia/ Majendra Maheswara*. Pustaka Mahardika. XX(131732.1)
3. Budhi Santosa, Iman. (2010). *Nguri-uri paribasan Jawi = Melestarikan peribahasa Jawa.* Intan Pariwara. XX(131751.1)
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5. Yrama, Widya (2008). *Cara belajar membaca dan menulis huruf jawa, jilid 2.* Yrama Widya .Publication info:, 2008 XX(131739.1)

UWS10602 Ethnic Relation

Synopsis

This subject focuses on the conceptual and practical aspect of the ethnic relation in Malaysia's community. The discussions will comprise the concepts of ethnic relation and the history of plural society construction. The matter of constitution as the core of the societal life will also be covered. Discussions will also look at the relationship between the development and the ethnicity in the aspect of economy, politics and social based on the approach of top-down and bottom-up by the government and the society.

References

1. Lembaga Penyelidikan Undang-undang (2003). *Perlembagaan Persekutuan*. Petaling Jaya: International Law Book Services. KPG 1744.51963.A3.A4 2003 rw
2. Mansor Mohd. Noor, Abdul Rahman Abdul Aziz dan Mohamad Ainuddin Iskandar Lee(2006). *Hubungan Etnik di Malaysia*. Petaling Jaya: Prentice Hall. DS595.m37 2006
3. Shamsul Amri Baharuddin (2007). *Modul Hubungan Etnik*. Shah Alam: Universiti Teknologi MARA. [Modul Hubungan Etnik]
4. Zaid Ahmad (2010). *Hubungan Etnik di Malaysia*. Shah Alam: Oxford Fajar Sdn. Bhd. DS595 .H82 2010
5. Wan Hashim. (2011). *Hubungan Etnik di Malaysia.* Kuala Lumpur : Institut Terjemahan Negara Malaysia. DS595 .W36 2011

UHB20202 Essential Academic English

Synopsis

This course enhances students' English language skills, emphasising listening and reading skills necessary for academic contexts. The course provides opportunities for students to learn the strategies to help them understand information from documentaries, lectures and paper presentations and develop analytical listening to differentiate between facts and opinions. This course also provides opportunities for students to develop skills to critically respond to academic materials such as journal articles.

References

1. Bowen, E. (2010). Listening in: Broadcasts, speachesand interviews. Edinburgh: Edinburgh University Press
2. Fairbairn, G. J. (2011). Reading, writing and reasoning: A gutdefor students. Maidenhead: Open University Press. LB2395 .F34 2011.
3. Lewis, J. (2002). Reading for academic success: Reading and strategies. Boston: Houghton Mifflin. LB2395.3 .L48 2002.
4. Metcalfe, M. (2006). Reading critically at university. Los Angeles: Sage. LB2395.3 .M47 2006.

5. Shipside, S. (2007). Effective communication: Get your message across nd learn how to listen. London: Dorling Kindersley. HF5718 .S54 2007.
6. Smith, L. C. (2005). Exploring content 1: Readingfor academic success. White Plains, NY: Longman. PE1122 .S64 2004.
7. Wright, L. (200l). Critical thinking: An introduction to analytical reading and reasoning. Oxford: Oxford University Press. B809.2 .W74 2001.

UHB30202 English for Technical Purposes

Synopsis

This course aims to prepare students with the skills to write reports and express ideas or opinions competently. Students will be equipped with persuasive strategies that can be applied to writing technical reports. The course will also enable them to practise these techniques by drafting and collaborating to produce assigned tasks. The students are also expected to orally present their proposals and written reports before an audience or a panel of examiners.

References

1. Bogdan, R C. (2007). Qualitative research for education: An introduction to theory and methods (51h ed.). Boston, MA: Pearson. LB1028 .B63 2007.
2. Chandra, S. (2013). Research methodology. Oxford, U.K.: Alpha Science Inti Ltd. H62 .C42 2013.
3. Grix, J. (2010). Information skills: Finding and using the right resources. New York: Palgrave Macmillan
4. Farquhar, J. (2012). Case study research for business. London, England: Sage. HD30.4 .F37 2012.
5. Hittleman, D. R (2006). Interpreting educational research: An introduction for consumers of research (41h ed.). Upper Saddle River, NJ: Pearson. LB1 028 .H57 2006.
6. Newby, P. (2014). Research methods for education (2nd ed.). Abingdon: Routledge. LB1028.N48 2014.
7. Neville, C. (201 0). The complete guide to referencing and avoiding plagiarism. Maidenhead: Open University Press. PN17l.F56 .N48 2010.
8. Scruggs, T. E. (2006). Applications of research methodology. Oxford: Elsevier. LC4704 .A66 2006.
9. Sekaran, U. (2013). Research methods for business: A skill-building approach (6th ed). Chichester, West Sussex: Wiley. HD30.4 .S44 2013.
10. Somekh, B. (2006). Action research: a methodology for change and development. Berkshire: Open University Press. LB1028.24 .S65 2006.

UWA10802 Islamic and Asian Civilization

Synopsis

This course provides an introduction to the human civilization; a relation between Malay, China, and India civilizations, Islam in Malay regions and its roles in building the Malaysia civilization, contemporary issues and globalization, and nation development process.

References

1. Saifullah Mohd *Sawi* (2009), *Sejarah dan tamadun Islam di Asia Tenggara*, Shah Alam Karisma Publications. BP63.A785 .S24 2009
2. Sazelin Arif, (2007), *Tamadun Islam dan tamadun Asia,* Shah Alam, Selangor: McGraw Hill. BP190.5 .T35 2007
3. Abu al-Fida al Hafiz Ismail ibn Kathir; penterjemah: Zaidah Mohd Nor *et al*., (2005), *Sejarah tamadun Islam Ibn Kathir*, Kuala Lumpur: Dewan Bahasa dan Pustaka. DS36.85.I32 2005 v.1
4. Mohd Liki Hamid, (2003), *Pengajian tamadun Islam*, Bentong: PTS Publications andDistributors. DS36.85 .P46 2003

5. Lok, Chong Hoe, (1998), *Tamadun Cina: falsafah, pandangan hidup dan aspek-aspek kesenian*, Kuala Lumpur: Pusat pembangunan dan Pendidikan Komuniti (CEDC) dan Sekretariat Falsafah dan Sains Islam. Universiti Sains Malaysia. DS721 .L64 1998
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7. Arkoun, Mohammed Ruslani, (2001), *kontemporer: menuju dialog antara agama*, Yogyakarta: Pustaka Pelajar. BP163 .A74 2001 N

UWS10503 Nationhood and Current Development of Malaysia

Synopsis

This course will provides students a fundamental concept, the processes of formation and development of Malaysia. The topics covered include the concept of state, Malacca Kingdom, implication of imperialism and colonization, spirit of patriotism and nationalism, independence and formation of Malaysia. Besides, students will also be exposed to the constitution of Malaysia, Malaysian Government System, Economic and Social Development Policy as the main policy in the national development. At the end of the course students will able to appreciate the roles and responsibilities of a good citizen to the country.

References

1. Zahrul Akmal Damin, Fauziah Ani, Lutfan Jaes, Khairunesa Isa, Siti Sarawati Johar, Harliana Halim, Khairul Azman Mohd Suhaimy, Shamsaadal Sholeh Saad, Ku Hasnan Ku Halim dan Mohd Akbal Abdullah (2009). Kenegaraan & Pembangunan Malaysia. Batu Pahat: Penerbit UTHM.
2. Ruslan Zainudin, Mohd Mahadee Ismail & Zaini Othman. (2005). Kenegaraan Malaysia. Shah Alam: Fajar Bakti. [JQ715 .R87 2005].
3. Nazaruddin Mohd Jali, Ma'rof Redzuan, Asnarulkhadi Abu Samah & Ismail Mohd Rashid. (2005). Pengajian Malaysia. Petaling Jaya: Prentice Hall. [DS596.6 .P46 2001 N2].
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5. Noor Aziah Mohd Awal. (2003). Pengenalan kepada Sistem Perundangan di Malaysia. Petaling Jaya: International Law Book Services. [KPG68 .N66 2003].

UHB40202 English for Occupational Purposes

Synopsis

This course employs a task-based learning approach and focuses on developing students' delivery of speech in oral interactions, job interviews and presentations. Particular emphasis will be given to promote the mastery of self-directed learning, team-work, research, oral presentations, reasoning and creativity. This course also enables students to acquire the knowledge and skills necessary for conducting and participating in meetings, which includes writing meeting documents and event proposals based on specific themes. Students will also be ex-posed to interview techniques.

References

1. Allen, J. G. (2004). The complete Q and A job interview book (4th ed.). Hoboken, NJ : John Wiley. H.F5549.5.16 .A44 2004.
2. Badger, I. (2003). Everyday business writing. Essex: Pearson. PElll5 .B327 2003.
3. Corfi.eld, R (2008). Preparing the perfect job application: Application forms and letters made easy. New Delhi: Kogan Page. HF5383 .C67 2008.
4. Haynes. Marion E. (2009). Meeting skills for Leaders: Make Meetings more Productive (4th Ed.). Rochester, NY: Axzo Press. HD30.3 .H39 2009.
5. Leigh, Judith. (2004). CV's and Job Application. New York: Oxford University Press. HF5383 .L44 2004.

6. Molinsky, Steven J, & Bliss, Bill. (1994). Day by Day: Englishfor Employment Communication (1st Ed.): Longman. PE1128. M67 1994.
7. Peberdy, Duncan. (2009). Brilliant Meetings: Ehat to Know, Do and Say to Have Fewer, Better Meetings. Harlow: Prentice Hill. HI-'5734.5 .P42 2009.
8. Wendleton, Kate. (2014). Mastering the Job Interview and Winning the Game (5th Ed.). Boston: Cengage Learning. HF5549.5.16 .W46 2014.
9. Wrathall, Jeff. (2011). Event Management: Theory and Practice. North Ryde, N.S.W: McGrawHilL. GT3405 . W72. 2011

UWS10303 Malaysian Studies and Culture

Synopsis

This course will provides students in basic understanding of Malaysia from various perspectives. Topics to be discussed include Malaysia in relation to its history, achievement and international affairs. In addition, students will also be exposed to the ethnic composition of the country, culture and heritage. Teaching and learning process enables student to acquire knowledge and appreciates the reality of life in Malaysia through experiential learning.

References

1. Abdul Halim Nasir. (2004). *Mosque Architecture in the Malay World*. Bangi: Penerbit Universiti Kebangsaan Malaysia. [NA4670 .A23 2004].
2. Nazaruddin Mohd. Jali. (2003). *Malaysian Studies: Nationhood and Citizenship*. Petaling Jaya: Pearson Prentice Hall.
3. Francis Loh kok Wah dan Khoo Boo Teik. (2002). *Democracy in Malaysia. Cornwall*: Curzon Press.
4. Khoo Kay Kim. (2001). *Malay Society: Tranformation and Democratisation*. Kelana Jaya: Pelanduk Publications.
5. Yahaya Ismail. (1989). *The Cultural Heritage of Malaysia*. Kuala Lumpur: Dinamika Kreatif Sdn. Bhd.
6. Andaya, B.W. and Andaya, L. Y. (1982). *A History of Malaysia*. London: Macmillan. [DS596 .A52 2001].
7. Mohamed Noordin Sopiee. (1974). *From Malayan Union to Singapore Separation, Political Unification in the Malaysian Region, 1945-65*. Kuala Lumpur: University of Malaya Press. [DS597 .M56 2005].

UQ*1XXX1 Co-Curriculum I

Synopsis

This course is offered in the form of multiple choice of activities for Diploma students and undergraduates. Three categories of activities offered are Sports and Recreational, Club/ Associations and Uniform Bodies.

UQ*1XXX1 Co-Curriculum II

Synopsis

This course is offered in the form of multiple choice of activities for Diploma students and undergraduates. Three categories of activities offered are Sports and Recreational, Club/ Associations and Uniform Bodies.

Synopsis of Faculty Courses

BDA 10602 Creativity & Innovation

Synopsis

This course focuses on developing a creative person who will eventually think strategically, creatively and critically. The knowledge and skills acquired throughout the course will later be applied by the students in solving problems and making decisions in the future. In this course, students will be exposed to various creativity and problem-solving techniques. Some of the skills to be covered throughout the course are problem solving, techniques in creativity and techniques in innovation.

References

1. Mumford, M.D. (2014). Leadership, Creativity and Innovation. Los Angeles: SAGE Reference. HD57.7.L442 2014
2. Bernacki, E. (2012). Wow! That's a Great Idea! Singapore: Prentice Hall. HD53.B47 2002
3. De Bono, E. (2013). Serious Creativity 1: Lateral Thinking Tools, Techniques and Application, Allscript Books, Singapore. BF408.D366 2003
4. Harris, L.V.A. (2014). Idea Engineering: Creative Thinking and Innovation. New York: Momentum. T49.5.H37
5. Tidd, J. (2014). Open Innovation Research, Management and Practice. Singapore: World Scientific. T175.5.T52

BDA 10203 Statics

Synopsis

This course is designed to provide the student with a clear and through presentation of the theory and applications of engineering mechanics – Statics. This course through its 6 chapters has been shaped in a way of which the principles are applied first to simple, then to more complicated situations. Each principle is applied first to a particle, then to a rigid body subjected to a coplanar system of forces, and finally to a general case of three-dimensional force systems acting on a rigid body. It begins with an introduction to mechanics – Statics, and are followed by the concept of equilibrium of a particle and rigid body, discussion of both concentrated and distributed force systems, the equilibrium of trusses, frames and machines, the centroid and centre of gravity and frictional forces.

References

1. Hibbeler, R.C. (2013). Engineering Mechanics - Statics, 13th SI Edition, Pearson. TA351.H52. 2013
2. Meriam, J.L., & Kraige, L.G. (2016). Engineering Mechanics- Statics, 8th Edition, John Wiley & Sons, Inc. TA351.B43 2013
3. Bear, F.P., & Johnson, E.R. (2013). Vector Mechanics for Engineers - Statics, 9th SI Edition, McGraw Hill. TA351.B43 2013
4. Pytel, Andrew (2017) Engineering mechanics: statics, Boston, MA: Cengage Learning, 2017 TA351.P97 2017
5. Pytel, Andrew (2017) Engineering mechanics: statics SI Edition, Boston, MA: Cengage Learning, 2017 TA352.P97 2017

BDA10703 Technical Drawing And CAD

Synopsis

This course provides the student with the skill to produce technical drawing using the following drafting skills i.e., manual lettering, technical drafting, basic geometric construction, single and multi-view drawings, scale measurement and the reading of technical drawings through drawings and related assignment. Students will also learn to develop their skill with the use of AutoCAD software.

References

1. Musa, M. A. (2013). *Pengenalan Lukisan Reka Bentuk Berbantu Komputer Autocad, Kuala Terengganu*: Penerbit Universiti Malaysia Terengganu. T385 .M39 2013

2. Hughes, N. (2013). *CAD for the Workshop*, New York: Crowood. TA174 .H83 2013
3. Bethune, J. (2013). Engineering Graphics with AutoCAD 2013, Boston: Pearson. T357 .B476 2009
4. Onstott, S. (2016). AutoCAD 2016 and AutoCAD LT 2016: Essentials. Indianapolis, Indiana: Autodesk. T385.O57 2016
5. Gupta, B.V.R. (2016). Engineering Drawing with Auto Cad. New Delhi: I.K. International. T385.G87 2016

BDA10803 Materials Science

Synopsis

Introduction; Materials Structure; Mechanical Behaviors of Metal; Crystal Imperfection and Diffusion; Phase Equilibrium and Transformation; Metals; Ceramic; Polymer; Advanced Materials.

References

1. Callister, W.D. (2010). Materials Science and Engineering: An Introduction, 8th Edition, John Wiley. TA403.C33 2011
2. Smith, W.F. (2010). Foundations of Materials Science and Engineering, 5th Edition, McGrawHill. TA403.S64 2010
3. Askeland, D.R. (2011). The Science and Engineering of Materials, 6th Edition, Cengage Learning. TA403.A844 2011
4. Hashim, J. (2013). Sains Bahan, Universiti Teknologi Malaysia. TA404.J37 2013
5. Askeland, D.R. (2014). Essential of Materials Science and Engineering, 3rd Edition, Cengage Learning. TA403.A75 2014
6. Fischer, T. (2009). Materials Science for Engineering Student, Elsevier. TA403.F57 2009

BDA 17201 Material Science Engineering Laboratory

Synopsis

The goals of this course are to expose the students to relate the material science theory and its implementation.

References

1. Callister, Jr.W.D. & Rethwisch, D.G. (2013). Fundamentals of Materials Science and Engineering, 4th Edition, Wiley. TA403.C34 2013
2. Dowling, N.E. (2013). Mechanical Behavior of Materials: Engineering Methods for Deformation, Fracture, and Fatigue, 4th Edition, Pearson Prentice Hall. TA404.8.D68 2013
3. Askeland, D.R., Fulay, P.P., & Wright, W.J. (2011). The Science and Engineering of Materials, 6th Edition, Cengage Learning. TA403.A844 2011
4. Smith, W.F., & Hashemi, J. (2010). Foundations of Materials Science and Engineering, 5th Edition, Mc-Graw Hill. TA403.S64 2010
5. Callister, Jr., & William, D. (2007). Materials Science and Engineering: An Introduction, 7th Edition, Wiley. TA403.C33 2007
6. Ashby, M.F. (1998). Engineering Materials 2, 2nd Edition, Oxford: Butterworth Heinemann. TA403.A83 1998
7. Askeland, D.R. (2014). Essential of Materials Science and Engineering, 3rd Edition, Cengage Learning. TA403.A75 2014

BDA 18201 Mech. Eng. Workshop 1

Synopsis

This course is designed to provide understanding on the usage of hand tools, measuring tools, machine operation in mechanical workshop. Student will undergo practical skill on safety regulations, fitting, sheet metal forming, turning, grinding, welding and milling.

References

1. Richard, R.K., John E.N., Roland O.M., & Warren, T.W. (2010). Machine Tool Practices, 11thed., Prentice Hall. TJ1185.M32 2014
2. SeropeKalpakjian & Steven, R.S. (2014). Manufacturing Engineering and Technology, 7th ed., Prentice Hall. TS176 .K34 2014
3. Hoffman, P.J. (2012). Precision Machining Technology, 2nd ed., Clifton Park, NY: Delmar Cengage Learning. TJ1189 .P73 2014
4. Sacks, R.J., & Bohnart, E.R. (2012). Welding: Principles and Practices, 4th Edition, McGraw-Hill. TS227.B63 2012

BDA 14403 Calculus for Engineers

Synopsis

This course introduces the Functions of Single and Multivariable: Domains, ranges, 3D-graphs, limit and continuity. Derivatives of Single and Multivariable Function: Quotient Rule and Product Rule, Mix derivatives, Implicit differentiation and chain rules. Total differentials and exact differentials. Local extreme values of functions of two variables and Lagrange multiplier. Multiple Integrations: Single integral- substitution, by part, rational of trigonometric functions, power trigonometric and partial fraction. Double integrals in Cartesian coordinates: Changing Order of Integration, Double Integrals in Polar Coordinates. Triple integrals: Cartesian coordinates Cylindrical coordinate and Spherical coordinate. Application of Multiple Integration: Areas, Volumes, Surface Areas, Mass, Moment of mass, Centre of mass/ gravity, inertial moment. Vector Calculus: Line integrals of scalar and vector field. Independence of path and conservative vector field. Green Theorem. Surface integrals of scalar and vector field. Application of Gauss's and Stokes' Theorem in Fluid Mechanics.

References

1. Arif, M. (2013). Calculus, Oxford, Alpha Science International. QA303.2.A74 2013
2. Anton, H. (2013). Calculus: Early Transcendentals, 10th ed., John Wiley & Sons. QA303.2.A57 2013
3. Petrovic, J. S. (2014). Advanced Calculus: Theory and Practice. Boca Raton, FL: CRC Press. QA303.2.P47 2014
4. Ron, L., & Bruce, H.E. (2015). Calculus Early Transcendental Function, 6th Editions, Cengage Learning. QA303.L39 2015
5. James, S. (2012). Calculus. USA. 7th Edition, Thomson Learning Inc. QA303.2.S73 2012

BDA 10903 Solid Mechanics I

Synopsis

This course will cover the introduction to stress and strain concept. Then, shear force and bending moment will be introduced in chapter two. Later, it moves into bending stress and subsequent chapter is torsion. The last two chapters are thin cylinder and stress analysis.

References

1. Hibbeler, R.C. (2014) Mechanics of Materials, 9th Edition, Pearson, Prentice Hall. TA405 .H54 2014.
2. Beer, F. P., Russell, E. J., Dewolf, J. T. and Mazurek D. F. (2015) Mechanics of Materials, 7th Edition. McGraw-Hill, New York. TA405 .M42 2015.
3. Gere, J. M. (2013) Mechanics of Materials, 8th Edition, Cengage Learning, Canada. TA405 .G47 2013.
4. De Silva, Clarence W., (2014) Mechanics of Materials, Boca Raton, FL : CRC Press. TA404.8 .D74 2014
5. Pytel, A. (2012) Mechanics of Materials, 2nd Edition, Cengage Learning, USA. TA405 .P97 2012.

BDA 14303 Electric and Electronic Technology

Synopsis

Basic Definition: current, voltage, power, energy, direction reference and poles. Ideal circuit elements. Circuit theorems. Kirchhoff voltage and Kirchhoff current Law. DC circuit analysis method: branch current analysis, current mesh analysis, nodal voltage analysis. Circuit theorems: Superposition theorem, Thevenin and Norton, Source transformation and Maximum Power Transfer. Energy storage elements: capacitor and inductor. Electrical and electronics component and logic gates.

References

1. Boylestadand, R.L.N. (2013). Electronic Devices and Circuit Theory, 11th Ed. PrenticeHall. TK7867.B69 2013
2. Bird, J. O. (2014). Electrical And Electronic Principles and Technology, 5th ed. Milton Park, Abington, Oxon: Routledge, TK146 .B57 2014
3. Monk, Simon (2015). The TAB Book of Arduino Projects: 36 Things to Make with Shields and Proto Shields. New York: McGraw-Hill Education. TJ223.P76 .M68 2015
4. Neamen, D.A. (2010). Microelectronics Circuit Analysis and Design, 4th Ed., McGraw Hill. TK7867.N434 2010
5. Floyd, T.L. (2007). Electronics Fundamentals: Circuits, Devices and Applications, 7th Ed., Prentice Hall. TK7816.F56 2007
6. Mukhopadhyay, Subhas, C. (2014). Internet of Things: Challenges And Opportunities, 1st Ed. Cham: Springer. TK7895.E43.I57 2014

BDA 17301 Mechanics Engineering Laboratory I

Synopsis

This course covers several experiments for Statics and Solid Mechanics. Statics: Equilibrium of Forces, Polygon of Forces, Equilibrium of Rigid Body, Principle of Moments, Friction on an Inclined Plane. Solid Mechanics 1: Tensile, Torsion, Shearing Force in Beam, Bending Stress in Beam, and Thin Cylinder.

References

1. Hibbeler, R.C. (2014). Mechanics of Materials, 9th Edition, Pearson, Prentice Hall. TA405.H54 2014
2. Beer, F. P., Russell, E. J., Dewolf, J. T., & Mazurek, D. F. (2015). Mechanics of Materials, 7th Edition. New York: McGraw-Hill. TA405.M42 2015
3. De Silva, Clarence W. (2014). Mechanics of Materials. Boca Raton, FL: CRC Press. TA404.8.D74 2014
4. Pytel, Andrew. (2017). Engineering Mechanics: Statics, Boston, MA: Cengage Learning. TA351.P97 2017
5. Pytel, Andrew. (2017). Engineering Mechanics: Statics SI Edition, Boston, MA: Cengage Learning. TA352.P97 2017

BDA 18301 Mech. Eng. Wokshop II

Synopsis

This course is designed to give exposure to the foundry process and automation systems and focuses on aspects of safety in the workshop.

References

1. Sahoo, M. (2014). Principles of Metal Casting, 3rd. ed., Mc Graw Hill. TS230.S23 2014
2. Campbell, J. (2011). Complete Casting Handbook: Metal Casting Processes, Metallurgy, Techniques and Design, Elsevier Butterworth-Heinemann. TS230.C354 2011
3. Martin, J. (2014). Handbook of Hydraulic Machines: Fundamentals of Hydraulic Power Systems. United Kingdom: Auris Reference. TC160.H36 2014
4. Hanssen, D.H. (2015). Programmable Logic Controllers. New Jersey: John Wiley & Sons. TJ223.P76 .H37 2015

5. Parr, A. (2011). Hydraulics and Pneumatics: A Technicians and Engineers Guide. Oxford: Butterworth-Heinemann. TJ840.P37 2011
6. Kandray, D.E. (2010). Programmable Automation Technologies: An Introduction to CNC, Robotics and PLCs. New York: Industrial Press. TS183.K36 2010

BDA 24303 Differential Equations

Synopsis

First Order Differential Equation: Formation. Methods of solution: separating the variables, homogeneous, linear and exact. Initial value problem. Applications: Newton's Law of cooling, linear motion. Second Order Linear Differential Equation with Constant Coefficients: Methods of solution: method of undetermined coefficients and method of variation of parameters. Applications in mechanical motions includes free oscillations and force oscillations. Laplace Transforms: Definition. Linearity. First shift theorem. Multiplying by t. Unit step functions. Delta functions. Second shift theorem. Inverse Laplace transform: Definition and its properties. Convolution theorem. Solve initial and boundary value problems for linear differential equations with constant coefficients which involve unit step functions, Dirac Delta functions and periodic functions. Fourier Series: Fourier series in interval (–l, l). Odd and even functions. Half range Fourier series. Partial Differential Equation: Heat equations. Wave equations.

References

1. Pal, Srimanta. (2015). Engineering Mathematics. Oxford Univ Press. TA330 .P35 2015
2. Bhattacharya, Subhamoy. (2015). Fundamentals of Engineering Mathematics. London: ICE Publishing. TA330 .B42 2015
3. Wirkus, Stephen, Allen. (2015). A Course in Ordinary Differential Equations. CRC Press, Taylor & Francis Group. QA372.W57 2015
4. Deng, Yuefan. (2015). Lectures, Problems and Solutions for Ordinary Differential Equations. World Scientific Publishing Co. Pte. Ltd. QA371 .D46 2015
5. Rehman,Hamood Ur. (2015). Partial Differential Equations and Mechanics., New York: Magnum Publishing. QA805.P37 2016
6. Bird, John. (2014). Engineering Mathematics. Routledge, London. TA330 .B57 2014

BDA 24202 Computer Programming

Synopsis

To give an introduction to programming concepts through the use of a high level programming language such as C. The programming language 'history and evolution'. Data types, input and output: operations and expressions. Programming Controls: while loop, for loop, if else and switch case. Structured programming and function.

References

1. Pal, M. (2013). C Programming: Including Numerical and Statistical Methods. Oxford: Alpha Science. QA76.7.P34 2013
2. McGrath, M. (2012). C Programming In Easy Steps, Warwickshire. QA76.73.M47 2012
3. Horton, I. (2011). Beginning C: From Novice To Professional, Berkeley, CA. QA76.73.C15.H67 2011
4. Ling, H.C. (2009). C Programming For Beginners. Kuala Lumpur: Prentice Hall. QA76.73.C15 .C74 2009
5. Wahab, S.H. (2009). Asas Pengaturcaraan C Bagi Beginner. Selangor: Venton Publishing. QA76.73.C15.S92 2009
6. Prakash, S. (2015). Programming in C. New Delhi : I K International Pvt Ltd. QA76.73.C153 .P72 2015
7. Siegesmund, M. (2014). Embedded C Programming: Techniques and Applications of C and PIC MCUS. Oxford: Newnes. QA76.73.C15 .S54 2014

8. Langbridge, J. A. (2015). Arduino Sketches: Tools and Techniques for Programming Wizardry. Indianapolis, IN: John Wiley & Sons. TJ223.P76.L36 2015

BDA 20103 Dynamics

Synopsis

This course will cover the kinematics of particles, kinetics of particles, kinematics of rigid bodies and kinetics of rigid bodies.

References

1. Nelson, E., Charles, B., McLean, W.G. & Merle P. (2011). Schaum's Outline of Engineering Mechanics Dynamics. The McGraw-Hill Companies.
   Retrieved from: https://www.accessengineeringlibrary.com/content/book/9780071713603
2. Meriam, J.L., Kraige L.G. & Bolton, J.N. (2016). Engineering Mechanics V.2, Dynamics, SI Version, John Wiley & Sons, Inc. TA352.M47 2016
3. Bear, F.P., Johnson, E. R. & Cornwell, P. J. (2009). Vector Mechanics for Engineers – Dynamics, McGraw Hill. TA352. B43 2013
4. Siswanto, W. A. (2008). Principles of Engineering Dynamics – Concise Theory and Applications, 1st Edition, Penerbit UTHM. QA845.S57 2008a
5. Pytel, A. (2017). Engineering Mechanics. Dynamics. Australia: Cengage Learning. TA352.P973 2017

BDA 20603 Fluid Mechanics I

Synopsis

This course will cover the Basic Principles of Fluid, Hydrostatic Pressure, Buoyancy and Effect of Vertical Acceleration on Fluid Static, Continuity Equations, Bernoulli Equation, Momentum Equation and Dimensional Analysis and Similarity.

References

1. Yunus, A.C., & John, M.C. (2014). Fluid Mechanics Fundamentals and Applications, 3rd Edition, McGraw Hill. TA357.C46 2014.
2. Jog, C.S. (2015). Fluid Mechanics: Foundations and Applications of Mechanics, 3rd Edition, Cambridge University Press. QC145.2 .J64 2015
3. Bullet, Shaun. (2016). Fluid and Solid Mechanics. World Scientific Publishing Company. QA805 .F58 2016
4. Elger, Donald F. (2014). Engineering Fluid Mechanics. 10th Edition. New York: John Wiley. TA357 .E53 2014
5. Sabol, Stuart (2016). Case Studies in Mech. Eng.: Decision Making, Thermodynamics, Fluid Mechanics and Heat Transfer. West Sussex Wiley. TJ148.S23 2016
6. Nakayama, Yasuki (2018). Introduction to Fluid Mechanics, 2nd Edition, Elsevier. Retrieved from: https://app.knovel.com/web/toc.v/cid:kpIFME0012/viewerType:toc/

BDA 20703 Thermodynamics I

Synopsis

This course will cover the basic concepts of thermodynamics & energy transfer, properties engineering working fluid, the laws of thermodynamics, entropy, thermodynamics cycles and introduction to heat transfer.

References

1. Cengel, Y.A., & Boles, M.A. (2015). Thermodynamics: An Engineering Approach, 8th Edition, McGraw Hill. TJ265 .C46 2015.
2. Cengel, Yunus A. (2015). Property Tables Booklet for Thermodynamics: An Engineering Approach. 8th Edition. Boston: McGraw Hill. TJ265 .C464 2015

3. Reisel, John R. (2016). Principles of Engineering Thermodynamics, Boston, MA. TJ265.R35 2016
4. Kroos, Kenneth A. (2015). Thermodynamics for Engineers, SI Edition, Stamford, CT. TJ265 .K764 2015
5. Borgnakke, Claus (2014). Fundamentals of Thermodynamics, 8th Edition, New York: Wiley. TJ265 .S66 2014
6. Sabol, Stuart (2016). Case Studies in Mech. Eng.: Decision Making, Thermodynamics, Fluid Mechanics and Heat Transfer. West Sussex Wiley. TJ148.S23 2016

BDA 20303 Mechanics of Machine

Synopsis

This subject covers several topics including gear systems, balancing, power transmission (belting), friction in screws and nut and mechanism. These essential topics in machines will provide students with proficient theoretical and graphical background in dealing with machine systems.

References

1. Norton, R.L. (2012). Design of Machinery: An Introduction to the Synthesis and Analysis of Mechanisms and Machines, McGraw-Hill. TJ175.N67 2012
2. Robert, L.N. (2013). Kinematics and Design of Machinery, 3rd Edition, Mc-Graw Hill. TJ175.N672 2013
3. Stanisic, Michael M. (2015). Mechanisms and Machines Kinematics, Dynamics, and Synthesis, Stamford, CT: Cangage learning. TJ181.S72 2015

BDA 20402 Engineering Materials Selection

Synopsis

In this course, students will learn Introduction to Materials Selection, Design Process, Engineering Materials and properties, Materials selection Chart.

References

1. Ashby, M.F. (2014). Materials: Engineering, Science, Processing and Design, 2nd ed., Oxford: Butterworth-Heinemann. TA403.A834 2014
2. Ashby, M.F. (2012). Materials and the Environment: Eco-Informed Material Choice, 2nd ed., Amsterdam: Butterworth-Heinemann. TA403.6.A73 2012.
3. Rahman, H.A. (2007). Engineering Materials Selection Teaching Modul, Penerbit UTHM.
4. Ashby, M.F. (2005). Materials Selection in Mechanical Design, 3rd ed., Butterworth-Heinemann. TA403.6.A83 2005
5. Dieter, G.E. (2013). Engineering Design, McGraw-Hill. TA174 .D53 2013

BDA 20903 Solid Mechanics II

Synopsis

This course is designed to give exposure to students about the principles of mechanics of materials to enhance capability of the student to solve the complex problems.

References

1. Hibbeler, R.C. (2014). Mechanics of Materials, 9th Edition, Pearson, Prentice Hall. TA405.H54 2014
2. Beer, F. P., Russell, E. J., Dewolf, J. T., & Mazurek, D. F. (2015). Mechanics of Materials, 7th Edition. New York: McGraw-Hill. TA405.M42 2015.
3. De Silva, Clarence W. (2014). Mechanics of Materials. Boca Raton, FL: CRC Press. TA404.8.D74 2014
4. Bhattacharyya, B. (2014). Engineering Mechanics. New Delhi: Oxford University Press. TA352.B43 2014

5. Philpot, Timothy A. (2014). Mechanics of Materials, 3rd Edition, Hoboken, NJ: Wiley. TA405 .T45 2014

BDA 30203 Fluid Mechanics II

Synopsis

This course will cover the topics such as Viscous Flow in Pipes, Differential Equations of Fluid Flow with emphasis on potential flow, Boundary Layer Theory, Introduction to Turbomachinery and Introduction to Compressible Fluid Flow.

References

1. Yunus, A.C.,& John, M.C. (2014). Fluid Mechanics Fundamentals and Applications, 3rd Edition, McGraw Hill. TA357.C46 2014.
2. Jog, C.S. (2015). Fluid Mechanics: Foundations and Applications of Mechanics, 3rd Edition, Cambridge University Press. QC145.2 .J64 2015
3. Bullet, Shaun. (2016). Fluid and Solid Mechanics. World Scientific Publishing Company. QA805 .F58 2016
4. Elger, Donald F. (2014). Engineering Fluid Mechanics. 10th Edition. New York: John Wiley. TA357 .E53 2014
5. Sabol, Stuart (2016). Case Studies in Mech. Eng.: Decision Making, Thermodynamics, Fluid Mechanics and Heat Transfer. West Sussex Wiley. TJ148.S23 2016
6. Nakayama, Yasuki (2018). Introduction to Fluid Mechanics, 2nd Edition, Elsevier. Retrieved from: https://app.knovel.com/web/toc.v/cid:kpIFME0012/viewerType:toc/

BDA30403 Thermodynamics II

Synopsis

The course emphasizes on the application of thermodynamics laws in engineering applications, exposing the working principle of power plants, machines and engines that operate based on thermodynamics system. The systems include steam and gas power plants, heat pump and refrigeration system, reciprocating compressor, internal combustion engines and non reactive mixtures, and cooling tower system.

References

1. Cengel, Y.A., & Boles, M.A. (2015). Thermodynamics: An Engineering Approach, 8th Edition, McGraw Hill. TJ265 .C46 2015.
2. Cengel, Yunus A. (2015). Property Tables Booklet for Thermodynamics: An Engineering Approach. 8th Edition. Boston: McGraw Hill. TJ265 .C464 2015
3. Reisel, John R. (2016). Principles of Engineering Thermodynamics, Boston, MA. TJ265.R35 2016
4. Kroos, Kenneth A. (2015). Thermodynamics for Engineers, SI Edition, Stamford, CT. TJ265 .K764 2015
5. Borgnakke, Claus (2014). Fundamentals of Thermodynamics, 8th Edition, New York: Wiley. TJ265 .S66 2014
6. Sabol, Stuart (2016). Case Studies in Mech. Eng.: Decision Making, Thermodynamics, Fluid Mechanics and Heat Transfer. West Sussex Wiley. TJ148.S23 2016

BDA 34103 Numerical Methods

Synopsis

This course covers basic numerical methods used in engineering application, from the basic numerical solution of simultaneously equations to the numerical solution in partial differential equations with implicit and explicit approaches. Standard numerical solutions in calculus involving integral and differential operations are also discussed. For a particular engineering application to show the modes, basic eigenvalue and eigenvectors numerical solution is also introduced.

References

1. Chapra, S.C. (2015). Numerical Methods for Engineers, 7th Edition, New York, McGraw Hill. TA345.C42 2015
2. Esfandiari, R.S. (2017). Numerical Methods for Engineers and Scientists using MATLAB, 2nd Edition, Boca Raton, CRC Press. TA335.E84 2017
3. Petras, I. (2016). Advances in Numerical Methods in Engineering with Matlab, 1st Edition, United Kingdom, Auris Reference Ltd. QA 297.A38 2016
4. Gupta, S.K. (2014). Numerical Methods for Engineers, 3rd Edition, New Academic Science. Retrieved from https://app.knovel.com/hotlink/toc/id:kpNMEE0012/numerical-methods-engineers/numerical-methods-engineers
5. Grewal, B. S. (2019). Numerical Methods in Engineering and Science - C, C++, and MATLAB®. Mercury Learning and Information. Retrieved from https://app.knovel.com/hotlink/toc/id:kpNMESCCM3/numerical-methods-in/numerical-methods-in

BDA 31302 Occupational Safety and Health

Synopsis

This course introduces students to knowledge and skills in occupational safety and health in workplace. Scope of study includes Health, Safety and Environment Managements: introduction to OSH, OSHA 1994 (Act 514), FMA 1967, EQA 1974, occupational safety and health management systems ISO 45001, safety, health and environment culture; Risk Management and Assessment: introduction to risk management, risk assessment techniques, HIRARC, best practices on hazard prevention and safety management; Physical Injury & Controls: introduction to physical injury, construction work, electrical work, mechanical work, chemical work; Health Hazards: introduction to health hazards & hygiene, chemical hazards, physical hazards, biological hazards, ergonomics hazards, fire hazards, hygiene, psychosocial hazards; Accident Investigation & Reporting: introduction, accident investigation, investigations and causes of incident, incident analysis and data collection method.

References

1. Akta Keselamatan Dan Kesihatan Pekerjaan Dan Peraturan-Peraturan: Semua Pindaan Sehingga September. (2008). MDC Publishers Printer Sdn. Bhd. 2008. KPG1390.A311994.A4 2008 rw.
2. Akta Kilang Dan Jentera Dan Peraturan-Peraturan (Akta 139): Semua Pindaan Hingga April. (2005) . MDC Publishers Printer Sdn. Bhd. 2005. KQB14.A4 2005 rw.
3. Ismail Bahari (2006). Pengurusan Keselamatan dan Kesihatan Pekerjaan. Edisi ke-2. McGraw Hill Education (Malaysia). T55.I85 2006.
4. Goetsh, David L. (2015). Occupational Safety and Health for Technologist, Engineers, and Managers. 8th ed. Boston: Pearson. T55.G63 2015.
5. Perry, Pat (2016). Health and safety questions and answers: a practical approach. 2nd ed. London: ICE Publishing. RA430.P47 2016.

BDA 41002 Entrepreneurship

Synopsis

This course introduces students to entrepreneurship concept, identifying business opportunities, business regulation and business support service, marketing strategies, production plan operation, business organization, finance and practical (field work).

References

1. Wan Fauziah, et. al. (2011). BPK 20802 (Keusahawanan), Universiti Tun Hussein Onn Malaysia, Johor.
2. UiTM Entrepreneurship Study Group (2011). Engineering Entrepreneurship. Prentice Hall Pearson Malaysia Sdn. Bhd.

3. Charles, E. B., & Garry, D.B. (2011). Entrepreneurship: A Small Business Approach. New York: McGraw-Hill. HD62.5 .B35 2011
4. Schaper, M., Volery, T., Weber, P., & Lewix, K. (2011). Entrepreneurship and Small Busiess, 3rd Asia-Pacific Edition. John Wiley & Son. HD2341.E57 2011
5. John. B., & Tidd. J. (2011). Innovation and Entrepreneurship, 2nd Edition, Chichester, West Sussex. HD53.B48 2011

BDA 30603 Heat Transfer

Synopsis

This course aims to introduce the physics of heat transfer processes by the mechanisms of conduction, convection and radiation and also to expose students to modern examples of engineering systems and design considerations that depend upon heat transfer. Topics in this course include mathematical analysis of idealized cases for steady and unsteady conduction, analytical and semi-empirical methods in convection, heat exchanger analysis and radiation exchange.

References

1. Cengel, Y.A., & Ghajar, A. (2015). Heat and Mass Transfer: Fundamentals & Applications, 5th Edition, New York: McGraw Hill. TJ260 .C46 20152.
2. Serth, Robert W. (2014). Process Heat Transfer: Principles, Applications and Rules of Thumb. 2nd Edition. Oxford: Academic Press. QC320 .S47 2014
3. Fakheri, A. (2014). Intermediate Heat Transfer. Boca Raton: CRC. QC320.F34 20145.
4. Sabol, Stuart (2016). Case Studies in Mech. Eng.: Decision Making, Thermodynamics, Fluid Mechanics and Heat Transfer. West Sussex Wiley. TJ148.S23 2016
5. Albers, B and Wilmanski, K (2015). Continuum Thermodynamics Part II: Applications and Examples. World
Scientific. Retrieved from: http://www.worldscientific.com/worldscibooks/10.1142/8523

BDA 30703 Control Engineering

Synopsis

This course will cover the introduction to control system, mathematical modeling, block diagram, transfer function, time response analysis, control system's stability, frequency response analysis and control system design using engineering software.

References

1. Nise, N. S. (2011). Control Systems Engineering, 6th Edition, John Wiley & Sons (Asia). TJ213.N57 2011
2. Zamri, O. (2015). Control System Engineering: Principles and Design, Penerbit UTHM, Batu Pahat. TA168.Z36 2015
3. Katsuhiko, Ogata. (2010), Modern Control Engineering, 5th Edition, Prentice Hall, New Jersey Sons. TJ213.O32 2010
4. Houpis, C.H. (2014). Linear control system analysis and design with MATLAB, 6th Edition, CRC Press/Taylor and Francis Group. TJ213.H68 2014
5. Wang, L. (2016). Industrial Automated Systems: Instrumentation and Motion Control. United Kingdom: Auris. TS183.I53 2016

BDA 30903 Solid Modeling

Synopsis

This course will provide students with skill and competency to produce 3D modeling by using SolidWorks software. Students will be exposed to develop 3D models through different kind of techniques, assembling different parts, make simulation from the assembled parts in order to verify and validate the mechanism and finally produce the technical drawing. Furthermore, students also will be exposed to project drawing where it will give advantages to them before work in the industrial.

References

1. SolidWorks Essentials (2014). Training Manual, Massachusetts, USA.
2. Advanced Part Modeling (2014). Training Manual, Massachusetts, USA.
3. Advanced Assembly Modeling (2014). Training Manual, Massachusetts, USA.
4. SolidWorks Drawing (2014). Training Manual, Massachusetts, USA.
5. Matt, L. (2011). Solidworks 2011 Assemblies Bible, Indianapolis: Wiley Publishing. T385.L654 2011

BDA 37401 Mechanics Engineering Laboratory II

Synopsis

This course covers several topics including Dynamics: Simple Pendulum Bob, Projectile, Energy Conservation, Mechanism of Crank and Universal Coupling and Mechanics of Machines: Undamped Beam Oscillation, Balancing of Rotating Mass, Computerized Gear Systems, Bevel Gear, and Belt Friction on Pulley.

References

1. Hibbeler, R.C. (2013). Mechanics for Engineers: Dynamics, 13th Edition, Prentice Hall. TA352.H52 2013.
2. Meriam, J.L. (2013). Engineering Mechanics, 7th Edition, Wiley. TA350.M47 2013.
3. Mostafa, M.A. (2013). Mechanics of Machiney, CRC Press. TJ181.M67 2013.
4. Stanisic, Michael M. (2015). Mechanisms and Machines: Kinematics, Dynamics, and Synthesis. Stamford, CT: Cangage Learning. 2015. TJ181 .S72 2015
5. Rana, N. (2014). Engineering Mechanics, Venus Books. TA350.R36 2014
6. Meriam, J.L., Kraige L.G. & Bolton, J.N. (2016). Engineering Mechanics V.2, Dynamics, SI Version, John Wiley & Sons, Inc. TA352.M47 2016
7. Pytel, A. (2017). Engineering Mechanics-Dynamics. Australia: Cengage Learning. TA352.P973 2017

BDA 37501 Thermofluid Laboratory

Synopsis

This course covers several experiments for Fluid Mechanics & Thermodynamics.

Thermodynamics:
Open ended laboratory project.
Topic: Calusius Clayperon Equation, Air Conditioning System & Heat Pump System, Polythropic Process, Heat Exchanger and Cooling Tower.

Fluid Mechanics:
These lab skills consist Hydrostatic Pressure, Impact of Jet and Flow Measuring Apparatus, Friction Losses in Pipe, Centrifugal Pump.

References

1. Yunus, A.C., & Micheal, A.B. (2015). Thermodynamics: An Engineering Approach, 8th Edition, McGraw Hill. TJ265.C46 2015
2. Jog, C.S. (2015). Fluid Mechanics: Foundations and Applications of Mechanics, 3rd Edition, Cambridge University Press. QC145.2 .J64 2015
3. Bullet, Shaun. (2016). Fluid and Solid Mechanics. World Scientific Publishing Company. QA805 .F58 2016
4. Reisel, John R. (2016). Principles of Engineering Thermodynamics, Boston, MA. TJ265.R35 2016
5. Kroos, Kenneth A. (2015). Thermodynamics for Engineers, SI Edition, Stamford, CT. TJ265 .K764 2015
6. Borgnakke, Claus (2014). Fundamentals of Thermodynamics, 8th Edition. New York: Wiley. TJ265 .S66 2014.

UHB30202 English for Technical Purposes

Synopsis

This course aims to prepare students with the skills to write reports and express ideas or opinions competently. Students will be equipped with persuasive strategies that can be applied to writing technical reports. The course will also enable them to practise these techniques by drafting and collaborating to produce assigned tasks. The students are also expected to orally present their proposals and written reports before an audience or a panel of examiners.

References

11. Bogdan, R C. (2007). Qualitative research for education: An introduction to theory and methods (51h ed.). Boston, MA: Pearson. LB1028 .B63 2007.
12. Chandra, S. (2013). Research methodology. Oxford, U.K.: Alpha Science Inti Ltd. H62 .C42 2013.
13. Grix, J. (2010). Information skills: Finding and using the right resources. New York: Palgrave Macmillan
14. Farquhar, J. (2012). Case study research for business. London, England: Sage. HD30.4 .F37 2012.
15. Hittleman, D. R (2006). Interpreting educational research: An introduction for consumers of research (41h ed.). Upper Saddle River, NJ: Pearson. LB1 028 .H57 2006.
16. Newby, P. (2014). Research methods for education (2nd ed.). Abingdon: Routledge. LB1028.N48 2014.
17. Neville, C. (201 0). The complete guide to referencing and avoiding plagiarism. Maidenhead: Open University Press. PN17l.F56 .N48 2010.
18. Scruggs, T. E. (2006). Applications of research methodology. Oxford: Elsevier. LC4704 .A66 2006.
19. Sekaran, U. (2013). Research methods for business: A skill-building approach (6th ed). Chichester, West Sussex: Wiley. HD30.4 .S44 2013.
20. Somekh, B. (2006). Action research: a methodology for change and development. Berkshire: Open University Press. LB1028.24 .S65 2006.

BDA 24103 Engineering Statistics

Synopsis

Roles of Statictic in Engineering: Engineering Method and Statistical Thinking, Principle of collecting engineering data. Sampling Distribution: Normal distribution, standard normal distribution, Binomial and Poisson Distribution, Sampling distribution of single mean, sampling distribution of the difference between two means, sampling distribution test: *t*, and *F* distribution. Decision making for sample: Point estimate, confidence interval for single mean, difference between two means, Type 1 and type 2 errors, hypothesis test for single mean, difference between two means. Descriptive Statistic: Numerical summaries of data, Discrete and continuous random variable, Frequency distribution and Histogram, Box plot, Time sequence plot, Scatter diagram. Simple Linear Regression: Graphical method, simple linear regression model, least square method, hypothesis testing for intercept and slope, coefficient of determination, correlation coefficient. Design of Experiment of single factor: Designing engineering experiment, completely randomized designed single-factor experiment, Analysis of variance, Multiple comparison using ANOVA, Residual.

References

1. Montgomery, D.C. (2012). Engineering statistics, 5th edition. QA276.12.M66 2012
2. Navidi, W.C. (2016). Statistics for Engineers and Scientists, 4th Edition. QA276.4.N38 2015
3. Devore, J.L. (2008). Probability and Statistics for Engineering and the Sciences, 7th Edition. QA273.D48 2008
4. Devore, J. (2014). Applied Statistics For Engineers and Scientists, 3rd Edition. QA276.D48 2014
5. Norizan M. (2013). Introduction to Basic Statistics for Engineers. TA340.I57 2013

BDA 40902 Engineering Economic

Synopsis

This course introduces students to the engineering economics, fundamental cost concepts, time value of money, private project evaluation, evaluating public project with benefit-cost ratio, replacement analysis and inflation.

References

1. Sullivan W.G, Wicks E.M. and Koelling C.P. (2012). Engineering Economy, 15th Edition. Upper Saddle River, New Jersey: Pearson. TA177.4 S94 2009
2. Blank, Leland T. (2014). Basics of engineering economy, 2nd edition. New York, NY: McGraw-Hill. TA177.4 .B52 2014
3. John A.W, Kenneth E.C, David B.P. (2010). Principles of Engineering Economic Analysis, 5th edition, Hoboken, NJ: John Wiley. TA177.4.W44 2010
4. Mohamad Sirin, R. (2007). Teori Asas Ekonomi Kejuruteraan, Faculty of Technology Management KUiTTHO. Malaysia. TA177.4 R67 2007
5. Park, C. S. (2007). Contemporary Engineering Economics, 4th Edition. Upper Saddle River, New Jersey: Prentice Hall. TA177.4 P372 2007

BDA 31103 Vibration

Synopsis

This course covers several topics in vibration and basic concept of sound. They are including fundamentals of vibration, free vibration, harmonically excited vibration, multi-degree-of-freedom vibration, determination of natural frequency and mode shapes, vibration control, vibration measurement and applications plus introduction to sound.

References

1. Bies, D. A., & Hansen, C. H. (2018). Engineering Noise Control: Theory and Practice, 5th Edition. New York: Taylor and Francis. TD892. B53 2018
2. Blevins, R. D. (2015). Formulas for Dynamics, Acoustics and Vibration. Chinchester : John Wiley. TA332 .B53 2015
3. Tuma, J. (2014). Vehicle Gearbox Noise and Vibration. Hoboken : Wiley. TL262 .T85 2014
4. Munjal, M. L. (2013). Noise and Vibration Control. Singapore: World Scientific. TD892 .M86 2013
5. Kelly, S. G. (2012). Mechanical Vibrations: Theory and Applications, SI Edition, Cengage Learning. TA355. K444 2012
6. Rao, S. S. (2004). Mechanical Vibration, 5th Edition in SI Unit, Upper Saddle River. NJ: Pearson Education. TA355. R36 2004
7. Dukkipati, R. V. (2010). Mechanical Vibrations. Oxford: Alpha Science. TA355. D844 2010
8. Gowda, T. (2012). Mechanical Vibrations. New Delhi: Tata McGraw Hill. TA355. G68 2012
9. Balachandran, B., & Magrab, E. B. (2009). Vibrations, 2nd Edition, Thomson Learning. TA355. B34 2009
10. Inman, D. J. (2008). Engineering Vibration, 3rd Edition, Upper Saddle River. NJ: Pearson Education. TA355. I55 2008
11. Ramamurti, V. (2008). Mechanical Vibration Practice and Noise Control. Oxford: Alpha Science. TA355. R35 2008
12. Ver, I. L. & Beranek, L. L. (2006). Noise and Vibration Control Engineering: Principles and Application, 2nd Edition. New Jersey: John Wiley. TD892. N65 2006

BDA 31203 Mechanical Component Design

Synopsis

This course consists of analysis, synthesis and design basic and complex mechanical component i.e. bearings, shafts, gears, and non-permanent joint such as screw and fastener with consideration of strength, rigidity, reliability, static and fatigue failure.

References

1. Richard. G.B., & Keith, N.J. (2015). Shigley's Mech. Eng. Design, 10th Edition in SI Units, McGraw Hill Education. (ISBN: 978-981-4595-28-5). TJ230 .B82 2008
2. Robert L.M. (2014). Machine Elements in Mechanical Design, New Jersey: Pearson. (ISBN: 978-013-3349-07-8). TJ230.M67 2004
3. Robert L. N. (2011). Machine Design – An Integrated Approach, 4th Edtion, New Jersey: Pearson. (ISBN: 978-013-1384-38-5). TJ230.N67 2011

BDA 31403 Manufacturing Technology

Synopsis

Introduction to production technology, Material characteristic and Selection of a materials, Metal machining process, Casting process, Metal forming process, Plastic manufacturing process, Powder metallurgy process, Joining processes.

References

1. Kalpakjian, S. (2014). Manufacturing Engineering and Technology. Singapore: Pearson. TS176.K34 2014
2. Singh, D. K. (2014). Manufacturing Technology. New Delhi: Ane Books Pvt. Ltd. TA403 .S56 2014
3. Rao, P. N. (2013). Manufacturing Technology: Metal Cutting. New Delhi: Mc Graw Hill.
4. Rao, P. N. (2013). Manufacturing Technology V1, 4th ed., New Delhi: McGraw Hill Education.
5. Youssef, H.A. (2011). Manufacturing Technology: Materials, Processes, and Equipment. Boca Raton, FL: Taylor & Francis/CRC Press.
6. Yi, X. (2010). Materials and Manufacturing Technology. Stafa-Zuerich: Trans Tech. TA401.3.M3745 2010

BDA 37301 Mechanics Engineering Laboratory III

Synopsis

This course covers several experiments for Solid Mechanics II: Deflection of Simply-supported Cantilever Beam, Buckling of Struts, Bending of Beam, Deflection of Curved Bars and Davits & Thick Cylinder and Control Engineering : Arduino-based identification, monitoring and control system (Arduino microcontrollers and compatible sensors).

References

1. Modern Control Engineering, 5th Edition, Prentice Hall, New Jersey Sons. 2010. TJ213 .O32 2010.
2. Basic Process Engineering Control. Berlin: Walter de Gruyter, 2014. TS156.8 .A32 2014
3. Control System Engineering, 6th Edition, The Benjamin Cummings Publishing Co. Inc. 2011. TJ213 .N57 2011
4. Mechanics of Materials, 6th ed. McGraw-Hill, New York. 2011. TA351.S72 2011
5. Mechanics of Material, 7th Edition, Cengage Learning, Canada. 2009. TA405 .G47 2009
6. Mukhopadhyay, Subhas Chandra. (2014). Internet of Things: Challenges and Opportunities, 1st Ed Cham: Springer. TK7895.E43 .I57 2014
7. Norris & Donald. (2015). The Internet of Things: Do-It-Yourself Projects with Arduino, Raspberry Pi, and Beaglebone Black, McGraw-Hill Education. QA76.8.R19 .N674 2015

BDA 38105 Industrial Training

Synopsis

Students are required to perform industrial training as trainee engineer in Mech. Eng. area within 10 weeks. During this period, students should be conducting training in industry for 10 weeks, while 2 weeks for final preparation and presentation in UTHM. They will encounter training as plan by industry such as planning, management, designing, assessment, specialization and supervising Mech. Eng.

project. By the end of this course, students will be assessed by their supervisors from faculty and industry.

References

1. Industrial Training's Log Book
2. Panduan Latihan Industri (Program Sarjana Muda dan Diploma)

UHB40202 English for Occupational Purposes

Synopsis

This course employs a task-based learning approach and focuses on developing students' delivery of speech in oral interactions, job interviews and presentations. Particular emphasis will be given to promote the mastery of self-directed learning, team-work, research, oral presentations, reasoning and creativity. This course also enables students to acquire the knowledge and skills necessary for conducting and participating in meetings, which includes writing meeting documents and event proposals based on specific themes. Students will also be ex-posed to interview techniques.

References

10. Allen, J. G. (2004). The complete Q and A job interview book (4th ed.). Hoboken, NJ : John Wiley. H.F5549.5.16 .A44 2004.
11. Badger, I. (2003). Everyday business writing. Essex: Pearson. PElll5 .B327 2003.
12. Corfi.eld, R (2008). Preparing the perfect job application: Application forms and letters made easy. New Delhi: Kogan Page. HF5383 .C67 2008.
13. Haynes. Marion E. (2009). Meeting skills for Leaders: Make Meetings more Productive (4th Ed.). Rochester, NY: Axzo Press. HD30.3 .H39 2009.
14. Leigh, Judith. (2004). CV's and Job Application. New York: Oxford University Press. HF5383 .L44 2004.
15. Molinsky, Steven J, & Bliss, Bill. (1994). Day by Day: Englishfor Employment Communication (1st Ed.): Longman. PE1128. M67 1994.
16. Peberdy, Duncan. (2009). Brilliant Meetings: Ehat to Know, Do and Say to Have Fewer, Better Meetings. Harlow: Prentice Hill. HI-'5734.5 .P42 2009.
17. Wendleton, Kate. (2014). Mastering the Job Interview and Winning the Game (5th Ed.). Boston: Cengage Learning. HF5549.5.16 .W46 2014.

Wrathall, Jeff. (2011). Event Management: Theory and Practice. North Ryde, N.S.W: McGrawHilL. GT3405 . W72. 2011

BDA 40502 Engineers & Society

Synopsis

This course will cover the introduction to professional ethics, theory and philosophy of ethics, values in professional ethics, the role and responsibilities of an engineer, role of engineer as an agent of change, engineering bylaws and standards, research and the development of an engineer, issues in professional ethics, the role of an engineer in the globalization era.

References

1. Abd. Manaf, A.R. (2002). Alam Jurutera, Edisi Kedua, Penerbit Universiti Malaya, Kuala Lumpur. TA190.A44 2005
2. Thiroux, J., & Krasemann, K. (2006). Ethics – Theory and Practice, 9th Edition, Prentice-Hall. BJ1012.T44 2007
3. Martin, M. W., & Schinzinger, R. (2005). Ethics in Engineering, 4th Edition, New York: McGraw Hill. TA157.M37 2005
4. Dean B., & Keith, G. (2011). Ethics in the Workplace, 3rd Edition, Cengage Learning.
5. Sivasubramanian, V. (2016). Environmental Sustainability Using Green Technologies, CRC Press. TA170.E584 2016

BDA 31003 Finite Element Method

Synopsis

General Introduction For All Finite Element methods., Matrix Algebra, Trusses, Axial Elements, Beams, Trusses and Frames, One Dimensional Elements, Two-Dimensional Elements, Analysis of One-Dimensional Heat Transfer Problems, Analysis of Two-Dimensional Heat Transfer Problems, Analysis of Fluid Mechanics Problems. Analysis of Two-Dimensional Solid Mechanics Problems, Applications of FE Software.

References

1. Moaveni, S. (2008). Finite Element Analysis, 3rd Ed. Pearson Education International. TA347.F5 .M62 2008
2. Liu, G. R. (2014). The Finite Element Method: A Practical Course. 2nd ed., Oxford: Butterworth-Heinemann. TA347.F5.L584.2014
3. Zienkiweikz, O. C. (2014). The Finite Element Methods for Fluid Dynamics. 7th ed., Oxford: Butterworth- Heinemann. TA640.2.Z53. 2014
4. Baskharone, E.A. (2014). The Finite Element Method with Heat Transfer and Fluid Mechanics Application. New York: Cambridge University Press. QC320.22. F56. B37.2014

BDA 40703 Industrial Engineering

Synopsis

This course consists of Introduction to industrial engineering, facilities planning, work study, ergonomics, production planning and control, and quality systems.

References

1. Heizer, J., & Render, B. (2014). Operations Management: Sustainability and Supply Chain Management, 11th ed., Prentice-Hall. TS155.H44 2014
2. Stevenson, W.J. (2015). Operations Management, 12th ed., Mc-Graw Hill. TS155.S73 2015
3. Nahmias, S. (2009). Production and Operations Analysis, 6th ed., McGraw Hill. TS155.N34 2009
4. Krajewski, L.J., Ritzman, L.P., & Malhotra, M.K. (2010). Operations Management: Processes and Supply Chains, 9th ed., Prentice Hall. TS155.K72 2010
5. Groover, M.P. (2007). Work Systems and the Methods, Measurement and Management of Work, Pearson-Prentice Hall. T60.6.G76 2007

BDA 40804 Integrated Engineering Design

Synopsis

The course consists of introduction of engineering design and detail explanation on the design process including all tools and methods involved in each design stage. Sustainability and economic considerations are included as well as engineering design tools such as finite element analysis and simulation analysis software. Case studies in different applications are also discussed.

References

1. Voland, G. (2004). Engineering By Design, 2nd Edition. Upper Saddle River, NJ: Prentice Hall. TA174.V64 2004
2. Eggert, R.J. (2005). Engineering Design. 2nd Edition, New Jersey: Pearson Prentice Hall. TA174.E34 2005
3. Farag, M. M. (2008). Materials and Process Selection for Engineering Design. 2nd Edition, Boca Raton: CRC. TA174.F374 2008
4. Reinders, A., Diehl, J. C., & Brezet, H. (2013). The Power of Design: Product Innovation in Sustainable Energy Technologies. Chichester, West Sussex: Wiley. TS170.5.P68 2013
5. Dieter, G. E., & Schmidt, L. C. (2013). Engineering Design, 5th Edition. New York: McGraw Hill. TA174.D53 2013
6. Dym, C. L. (2014). Engineering Design: A Project-Based Introduction, 4th Edition, New York: Wiley. TA174.D95 2014

7. Chang, K.H. (2015). Design Theory and Method using CAD/CAE. London: Academic Press. TA174.C42 2015
8. Striebig, B.A. (2016). Engineering Application in sustainable Design and Development. Boston: Cengage Learning. TA170. S77 2016

BDA 49002 Bachelor Degree Project I

Synopsis

The Bachelor's Degree Project (PSM) is a systematic academic training which utilizes the use of engineering knowledge, skills, concepts and problem-solving techniques. A project may involve: (1) study of a phenomenon/process/system, (2) design/construction of components/products, (3) software development, or (4) case study. A project could be industrial-based or lab-based. The Bachelor's Degree Project is divided into two sections; (1) Bachelor Degree Project I and (2) Bachelor Degree Project II with the former being the prerequisite for the latter and each carried out consecutively in two separate semesters.

This project could be industrial-based or lab-based. Bachelor Degree Project is divided into two sections:

(1) Bachelor Degree Project I.
(2) Bachelor Degree Project II.

Bachelor Degree Project I is a prerequisite for Bachelor Degree Project II.

References

1. UTHM Thesis Writing Guidelines, UTHM UTHM Thesis Writing Guidelines, UTHM.
2. Bachelor's Degree Project Guidelines, Faculty of Mechanical and Manufacturing Engineering, UTHM.
3. Fisher, E. (2014). Enjoy Writing Your Science Thesis or Dissertation: A Step-By-Step Guide to Planning and Writing a thesis or Dissertation for Undergraduate and Graduate Science Students, 2nd ed., Imperial College Press. T11.F57 2014.

BDA 49104 Bachelor Degree Project II

Synopsis

Bachelor Degree Project II is the continuation of Bachelor Degree Project I. It is an important mechanism in teaching and learning because it integrates all subjects acquired in engineering. This course will also develop the student's capability to present, discuss and analyse results of the research clearly, effectively and confidently in both oral presentation and in dissertation.

References

1. UTHM Thesis Writing Guidelines, UTHM.
2. Bachelor's Degree Project Guidelines, Faculty of Mechanical and Manufacturing Engineering, UTHM.
3. E. Fisher (2014) Enjoy Writing Your Science Thesis or Dissertation: A Step-By-Step Guide to Planning and Writing a thesis or Dissertation for Undergraduate and Graduate Science Students, 2nd ed., Imperial College Press. T11.F57 2014.

Elective Courses

BDB 40103 Thermodynamic of Materials

Synopsis

This course provides the basis for organizing information about how matter behaves through understanding of thermodynamic structure and basic equation. The course enables understanding of generation ofequilibrium state in one component system and in the binary phase diagram.

References

1. Parida, S.C. (2010). Thermal And Thermodynamic Stability of Nanomaterials.TA418.52.T43 2010
2. Nicolis, G. (2012). Kinetics and Thermodynamics of Multistep Nucleation and Self-Assembly in Nanoscale Materials. TA418.9.N35.K56 2012
3. Robert, T.D. (2006). Thermodynamics in Materials Science, CRC Press.TA403.6.D46
4. Callister, W.D. (2003). Materials Science and Engineering an Introduction, John Wiley & Sons. TA403.C33
5. Miranda, R. (2014). Surface Modification by Solid State Processing, Woodhead. TA418.7.S975 2014

BDB 40203 Materials Testing

Synopsis

In this course, several material testing will be learnt. This will include mechanical testing and non-destructive testing. The microscopy technique, spectroscopy technique as well as thermal analysis test are also included.

References

1. Callister, W.D. Jr. (2010). Materials Science and Engineering: An Introduction, 8th Edition, John Wiley. TA403.C33 2011
2. Smith, W.F. (2010). Foundations of Materials Science and Engineering, 5th Edition, McGrawHill. TA403.S64 2010
3. Askeland, D.R. (2011). The Science and Engineering of Materials, 6th Edition, Cengage Learning. TA403.A844 2011
4. Hashim, J. (2013). Sains Bahan, Universiti Teknologi Malaysia. TA404.J37 2013
5. Askeland, D.R. (2014). Essential of Materials Science and Engineering, 3rd Edition, Cengage Learning. TA403.A75 2014

BDB 40303 Mechanical Metallurgy

Synopsis

This course covers topics on: Introduction to Plasticity and Elasticity theory; Plastic and Elastic Deformation; Dislocation theory and strengthening mechanism, Metal Working Process.

References

1. Hosford, W.F. (2011). Metal Forming: Mechanics and Metallurgy, Cambridge Press. TS213.H67 2011
2. Yin, R. (2011). Metallurgical Process Engineering. New York: Springer. TN665.Y56 2011
3. William D. Callister, Jr. (2011). Materials Science & Engineering an Introduction, John Wiley & Sons. TA403.C33 .2011
4. Sharma, C.P. (2004). Engineering Materials Properties and Applications of Metals and Alloys. India: Prentice Hall. TA403.S55 2004
5. Delmonte, J. (2018). Metal/Polymer Composites. US: Springer.

BDB 40403 Corrosion & Prevention

Synopsis

This course will provide understanding in corrosion principles and electrochemical thermodynamics and kinetics of corrosion. Different forms of corrosion and atmospheric corrosion will be included as well as learning on corrosion prevention and protection.

References

1. Fontana, M.G. (1987). Corrosion Engineering, 3rd Edition McGraw-Hill. TA418.74.F66 1986 N4
2. Roberge, P.R. (2012). Handbook of Corrosion Engineering, McGraw-Hill. TA418.74.R624 2012
3. Stansbury, E.E., & Buchanan, R.A. (2000). Fundamentals of Electrochemical Corrosion, ASM International.
4. Zaki A. (2006). Principles of Corrosion Engineering and Corrosion Control, Butterworth-Heinemann. TA462.A35 2006
5. Denny, A.J. (2005). Principles and Prevention of Corrosion, 2nd edition, Pearson. TA462.J56 1996
6. Branko, N. (2015). Popov Corrosion Engineering: Principles and Solved Problems. New York: McGraw-Hill. TA418.74 .R62

BDB 40503 Applied Metallurgy

Synopsis

In this course the student will learn about the definition and casting process characterization which include the mould and patterns. There are four types (sand casting, melt casting, die casting and centrifugal casting) of casting process and their characterization identification will be covered in this course. Besides that, solidification in casting products including the solidification mechanism, fluid flow phenomena and casting defects are also included in this course. The student also will learn about the details of powder metallurgy processing, mechanical and physical property and application in powder metallurgy.

References

1. Delmonte, J. (2018). Metal/Polymer Composites. Springer US.
2. Roberge, P.R. (2012). Handbook of Corrosion Engineering, McGraw-Hill. TA418.74.R624 2012
3. Stansbury, E.E., & Buchanan R.A. (2000). Fundamentals of Electrochemical Corrosion, ASM International.
4. Zaki, A. (2006). Principles of Corrosion Engineering and Corrosion Control, Butterworth-Heinemann. TA462.A35 2006
5. Denny A.J. (2005). Principles and Prevention of Corrosion, 2nd Edition, Pearson. TA462.J56 1996
6. Davis, J.R. (2000). Corrosion: Understanding the basics, ASM International. TA462.C694 2000

BDB 40603 Engineering Polymer and Ceramics

Synopsis

In this course, students will learn about introduction to non-metallic material, Non-metallic material processing, Ceramic processing, Polymer processing.

References

1. Mittal, V. (2011). Advanced Polymer Nanoparticles: Synthesis and Surface Modifications. CRC Press. TP156.P6 .A38
2. Aneli, J. N. (2013). Polymers for Advanced Technologies: Processing Characterization and Applications, Apple Academic Press. TA418.9.C6 .P67
3. Biron, M. (2017). Thermoplastics and Thermoplastic Composites. William Andrew.
4. Leblanc, J. L. (2018). Filled Polymers: Science and Industrial Applications. CRC Press.
5. Bansal, N.P. (2011). Processing and properties of advanced ceramics and composites III, Wiley; American Ceramic Society TA418.9.C6 .P78

BDB 40703 Composites

Synopsis

This course contains topics such as Introduction to composite materials, Reinforcement and matrix, Properties of composite materials, Processing and fabrication in composite materials, Application for composite materials.

References

1. Biron, M. (2017). Thermoplastics and Thermoplastic Composites. William Andrew.
2. Chawla, K. K. (2018). Composite Materials: Science and Engineering. (K. K. Chawla, Ed.) Composite Materials: Science and Engineering, 5th ed. Birmingham. USA: Springer New York.
3. Delmonte, J. (2018). Metal/Polymer Composites. Springer US.
4. Leblanc, J. L. (2018). Filled Polymers: Science and Industrial Applications. CRC Press.
5. Mallick, P. K. (2017). Fiber-Reinforced Composites: Materials, Manufacturing, and Design, 3rd Edition. CRC Press.
6. Mazumdar, S. (2016). Composites Manufacturing: Materials, Product, and Process Engineering. CRC Press.
7. Mittal, V. (2016). Spherical and Fibrous Filler Composites. Wiley.
8. Plueddemann, E. P. (2016). Interfaces in Polymer Matrix Composites: Composite Materials. Elsevier Science.
9. Rothon, R. (2014). Particulate-filled Polymer Composites. Rapra Technology.
10. Xanthos, M. (2015). Functional Fillers for Plastics. Wiley.

BDB 40803 Advanced Materials

Synopsis

Smart and functional materials, Light materials and metal foams, Bio-materials, Nano materials, Thin Film and coating.

References

1. Lu and An H. (2009). Nanocasting: A Versatile Strategy For Creating Nanostructured Porous Materials, Royal Society of Chemistry. TA418.9.N35.L82 2009.
2. Ozin & Geoffrey A. (2009). Nanochemistry: A Chemical Approach to Nanomaterials, RSC Publishing. TA418.9.N35 .O94 2009.
3. Tang & Zikang. (2008). Nanoscale Phenomena: Basic Science to Device Applications, Springer. TA418.9.N35 .N36 2008.
4. Cao. (2011). Nanostructures & Nanomaterials: Synthesis, Properties and Applications, World Scientific. QC176.8.N35 .C36 2011.
5. Mallick, P. K. (2017). Fiber-Reinforced Composites: Materials, Manufacturing, and Design, 3rd Edition. CRC Press.

BDB 40903 Engineering Ceramics

Synopsis

The goals of this course are to develop a good understanding on recent application of ceramic materials including processing and fabrication technique equipped with their chemistry and structural arrangement and mechanism at atomic level.

References

1. Ralf, R. & I-Wei, C. (2008). Ceramic Science and Technology, Wiley-Vch Verlag. TA455.C47 2008
2. Rahaman, M.N. (2003). Ceramic Processing and Sintering, Marcel Dekker. TP807.R34 2003
3. Heimann, R.B. (2010). Classic and Advanced Ceramics: from Fundamentals to Applications, John Wiley. TP807.H43 2010
4. Mrityunjay, S., & Hua-Tay, L. (2006). Developments and Applicationss of Advanced Engineering Ceramics and Composites, the American Ceramic Society, Wiley. TA 455.C43.C48 2005

5. Mazumdar, S. (2016). Composites Manufacturing: Materials, Product, and Process Engineering. CRC Press.

BDB 41003 Engineering Polymers

Synopsis

In this course, students will learn about introduction to polymer, polymer rheology, polymer blends and compounding, polymer processing, polymer quality and testing, and sustainability of polymer.

References

1. Chaudhary, R.G. (2016). Polymer Characterization, New Rochelle, New York: Magnum Publishing LLC. QD139.P6.P64 201
2. Stan, F. (2016). Polymers and Composites in Engineering: Processing, Properties and Applications. Zurich: Trans Tech Publications. XX171457.1.
3. Hamrang, A. (2015). Applied Methodologies in Polymer Research and Technology, Toronto: Apple Academic. TA455.P58 .A66 2015
4. Grellma, W. (2013). Polymer Testing, Carl Hanser Verlag GmbH & Company KG. TA455.P58.P64 2013
5. Thomas, S. (2013). Polymer Processing and Characterization Toronto: Apple Academic Press. TA455.P58.P64 2013

BDB 41103 Surface Engineering

Synopsis

This course will cover on different type of surface modification, thin film and coating. Various application of surface engineering such as electrical and electronic and bio-materials will also be studied.

References

1. Martin, P.M. (2011). Introduction to Surface Engineering and Functionally Engineered Materials, John Wiley and Sons.
2. Davis J.R. (2001). Surface Engineering for Wear and Corrosion Resistance, ASM International. TA462.S97 2001
3. Cotell, C.M. (1994). Surface Engineering, ASM International TA459.A854 1994 r
4. Batchelor, A.W., Loh, N. L., & Chandrasekaran, M. (2011). Materials Degradation and Its Control by Surface Engineering, Imperial College Press. TA418.7.B38 2011
5. Miranda, R. (2014). Surface Modification by Solid State Processing, Woodhead. TA418.7.S975 2014

BDB 41203 Advanced Design Method

Synopsis

This course is designed to introduce a deep theoretical understanding of product life-cycle and prepare students with more skills and competency to assist in generating new ideas/solutions of problem and producing 3D modelling based on Computer Aided Design (CAD) software.

References

1. Chang, K.H. (2015). E-Design: Computer-Aided Engineering Design, Elsevier.
2. Dieter, G.E., & Schmidt, L.C. (2013). Engineering Design, McGraw-Hill. TA174.D53 2013
3. Reinders, A., Diehl, J.C., & Brezet, H. (2013). The Power of Design: Product Innovation in Sustainable Energy Technologies, Wiley. TS170.5.P68 2013.
4. Stewart, K. (2005). Microsoft Office Excel 2003: A Professional Approach, McGraw-Hill. HF5548.4.M523.S73 2008
5. Chowdhury, S. (2003). The Power of Design for Six Sigma, Dearborn Trade. HD31.C465 2003

BDB 41303 Excel for Engineers

Synopsis

Microsoft Excel is a powerful tool essential for managing and presenting data in today's working environment. One powerful feature of the spreadsheet lies in its capability to rapidly compare the effects of changing parameters on the solution to an engineering problem. In this way, the sensitivity of the solution to each variable may be determined. In this course, you gain the basic, intermediate and advanced excel knowledge and skills to create and edit worksheets, use formulas and functions, sort and filter detail data visually, and present summary information in a consumable and professional format.

References

1. Joyce, J.N. (2016). Microsoft Official Academic Course (MOAC) MICROSOFT EXCEL 2016, Microsoft Learning and John Wiley & Sons, Inc. (ISBN: 978-1-11-927299-1).
2. Larsen, R.W. (2013). Engineering with Excel, 4th Edition, Boston: Pearson. (ISBN: 978-013-2788-65-6). TA345.L37 2013
3. Alexander, M. (2016). Excel Dashboards & Report for Dummies, 3rd Edition, John Wiley & Sons, Inc. (ISBN: 978-111-9076-76-6). HF5548.A53 2016
4. Alexander, M. (2016). Excel 2016 Power Programming with VBA, Indianapolis, IN: Wiley. (ISBN: 978-111-9067-72-6). HF5548.A53 2016
5. McGrath, R.E. (2015). Creating and Verifying Data Sets with Excel, Los Angeles: SAGE. (ISBN: 978-148-3331-45-4). QA276.45.M53 .M33 2015
6. Billio, E.J. (2007). Excel for Scientist and Engineers: Numerical Method, John Wiley & Sons, Inc. (ISBN: 978-047-1387-34-3). TA345.B54 2007

BDC 40103 Control System Design

Synopsis

This subject covers important concept in the analysis and design of advance control systems. They are including Control Systems Analysis and Design by the Root locus method; Control Systems Analysis and Design by the Frequency Response Method; Design of PID Controller; Control Systems Analysis in State Space; Control Systems Design in State Space; Digital Control System; Implementing the Controls Scheme with Hardware.

References

1. Cela, A. (2013). Optimal Design of Distributed Control and Embedded Systems. New York: pringer Publishing. TA168.C44 2013
2. Xue, D. (2015). Modeling, Analysis and Design of Control Systems in MATLAB and Simulink. Hackensack: World Scientific Publishing. TJ213.X83 2015
3. Lovera, M. (2015). Control-Oriented Modelling and Identification: Theory and Practice. United Kingdom: Institution of Engineering and Technology. TJ213 .C36 2015
4. Ogata, K. (2010). Modern Control Engineering, 5th Edition, Prentice Hall, New Jersey Sons. TJ213.O32 2010
5. Norman, S. N. (2011). Control System Engineering, 6th Edition, The Benjamin Cummings Publishing Co. Inc. TJ213.N57 2011

BDC 40203 Stress Analysis

Synopsis

Introduction to stress, strain and stress-strain relationships; The strain measurement methods and related instrumentation; Stress analysis by using photo elasticity method.

References

1. Young, W.C. (2012). Roark's Formulas for Stress and Strain, 8th ed., McGraw-Hill. TA407.2.Y68 2012.
2. Gere, J.M. (2012). Mechanics of Materials, SI ed., Mason, OH, Cengage Learning. TA405.G47 2012.

3. Srinivas, J. (2012). Stress Analysis and Experimental Techniques: An Introduction. TA407.S64 2012
4. Doyle, J.F. (2004). Modern Experimental Stress Analysis: Completing the Solution of Partially Specified Problems, Hoboken. NJ: John Wiley. TA645.D69 2004.
5. Megson, Thomas Henry G. (2014). Structural and Stress Analysis. Amsterdam: Butterworth-Heineman. TA645 .M43 2014

BDC 40303 Kinematics Mechanism

Synopsis

Introduction to Mechanism and Kinematics; Basic Principle of Movement; Analysis of Position; Analysis of Velocity; Analysis of Acceleration; Cams; Planetary Gears.

References

1. Norton, R.L. (2012). Design of Machinery: An Introduction to The Synthesis and Analysis of Mechanisms and Machines, 5th Edition, McGraw-Hill. TJ175.N67 2012.
2. Robert, L. Mott, Edward M. Vavrek & Jyhwen, Wang. (2017). Machine Elements in Mechanical Design, 6th Ed., Pearson. ISBN-13: 978-0134441184.
3. Myszka, D.H. (2005). Machines and Mechanisms: Applied Kinematics Analysis, Pearson. TJ175.M97 2005.
4. Rattan, S.S. (2014). Theory of Machines, 4th Edition, Tata McGraw-Hill. ISBN-13: 978-9351343479.
5. Uicker, J.J., Gordon, R.P., & Shigley, E. L. (2017). Theory of Machines and Mechanisms, 5th Edition, New York: Oxford University. ISBN: 9780190264505.

BDC 40403 Fatigue and Fracture Mechanics

Synopsis

This subject covers the principles in linear elastic and elastic-plastic fracture mechanics. They are including comprehensive theoretical and analysis in micro-mechanisms fracture, fatigue, Mechanical aspects of fracture (crack propagation curve, effect of constraint, validity limits of fracture mechanics concepts).

References

1. Anderson, T.L. (2005). Fracture Mechanics: Fundamental and Applications, 3rd Edition. Boca Raton: Taylor and Francis. TA409. A52 2017
2. Kundu, T. (2008). Fundamentals of Fracture Mechanics. Boca Raton: CRC Press. TA409.K86 2008
3. Lee, Y.L., Pan, J., Hathaway, R. & Barkey, M., (2005). Fatigue Testing, and Analysis: Theory and Practice, Butterworth-Heinemann. TA418.38.F39 2005
4. Norman, E. D. (2013). Mechanical Behavior of Materials: Engineering Methods for Deformation, Fracture, and Fatigue, Pearson. TA404.8 .D68 2013
5. Campbell, F. C. (2012). Fatigue and Fracture: Understanding the Basics. Materials Park. Ohio: ASM International. TA409 .F38 2012

BDC 40503 Tribology

Synopsis

The course is designed to expose the basic concepts of lubrication, wear, friction, and other related phenomena in conjunction with the design and selection of machine elements particularly for the purpose of bearings, in order to provide students with the knowledge of Tribology.

References

1. Stachowiak, G.W., & Batchelor, A.W. (2014). Engineering Tribology, 4th Edition, Butterworth. TJ1075.S72 2014

2. Bhusan, B. (2013). Principles and Application of Tribology, 2nd Edition, Wiley and Sons. TJ1075.B484 2013
3. Gohar, R. (2012). Fundamentals of Tribology, 2rd Edition, Imperial College Press. TJ1075.G634 2012.
4. Khonsari, M.M., & Booser, E.R. (2008). Applied Tribology, 2th Edition, Prentice Hall. TJ1075.K46 2008.
5. Martin, J.M., & Ohmae, N. (2008). Nano Lubricants, John Willey and Sons. TJ1075.N37 2008.
6. Stachowiak, G. (2014). Engineering Tribology, Butterworth-Heinemann. TJ1075.S72 2014
7. Mihir K. G. (2014). Fundamentals of Fluid Film Lubrication. Retrieved from: https://www.accessengineeringlibrary.com/content/book/9780071834971/chapter/chapter12

BDC 40603 Robotic

Synopsis

This subject covers important concept and theories in the kinematic analysis of robotics and manipulator systems. The analysis including Velocity and Static's in Manipulators; Dynamics of Manipulators; Trajectory Planning and Generation; Actuators and Sensors; Position and Force Control of Manipulators.

References

1. Ashitava, G. (2006). Robotics: Fundamental Concepts and Analysis, Oxford University Press.
2. Man, Z. (2005). Robotics, Prentice Hall. TJ211.G47 2006.
3. Spong, M. W., Hutchinson, S., & Vidyasagar, M. (2006). Robot Dynamics and Control, John Wiley & Sons. TJ211.4.S66 1989.
4. Craig, J. J. (2005). Introduction to Robotics: Mechanics and Control, 3rd Edition. Upper Saddle River, NJ: Pearson/ Prentice Hall. TJ211.C72 2005.
5. Pizarro, D. (2016). An Introduction to the Industrial Automation and Robotics. United Kingdom: Auris Reference. TJ213.I577 2016

BDC 40703 Modeling and Simulation

Synopsis

Overview of Physics and Engineering Laws, System Modelling, Computer Simulation, State-Space Modeling, System's performance and stability, Non-linear system, MATLAB/ Simulink software.

References

1. Micouin, P. (2014). Model-Based Systems Engineering: Fundamentals and Methods, John Wiley and Sons, Publisher Edition. TA168.M52 2014
2. Lovera, M. (2015). Control-Oriented Modelling and Identification: Theory and Practice. United Kingdom: Institution of Engineering and Technology. TJ213.C36 2015
3. Houpis, C.H. (2014). Linear Control System Analysis and Design with MATLAB, 6th Edition, CRC Press/Taylor and Francis Group. TJ213.H68 2014
4. Xue, D. (2015). Modeling, Analysis and Design of Control Systems In MATLAB and Simulink. Hackensack: World Scientific. TJ213 .X83 2015
5. Box, George E. P. (2016). Time Series Analysis: Forecasting and Control, 5th Edition. Hoboken, NJ: John Wiley. QA280 .T55 2016

BDC 40803 Acoustic and Noise Control

Synopsis

This subject covers several topics in Fundamental of Acoustics, Legislative Requirement, Audiology of Hearing, Acoustic Measuring Devices and Analysis Technique, Assessment of Noise, Room Acoustics, Enclosure and Barrier.

References

1. Ramamurti, V. (2008). Mechanical Vibration Practice and Noise Control, Oxford: Alpha Science.
2. Ver I. L., & Beranek, L.L. (2006). Noise and Vibration Control Engineering: Principles and Application, 2nd Edition. New Jersey: John Wiley.
3. Biesand, D. A. (2009). Engineering Noise Control: Theory and Practice, 3rd Edition. New York: Taylor and Francis.
4. Ghazali, M. I., Salleh, S. M., & Yahya, M. N. (2002). Noise and Vibration, BDC 4013, Penerbit UTHM. TD892.M55 2007
5. Smith, B. J. (1996). Acoustics and Noise Control, 2nd Edition, Longman Group UK Limited. NA2800.S64 1996
6. Kinsler, L. et. al. (2000). Fundamental of Acoustics, John Wiley. QC243.F86 2000
7. Osama, A.B.H. (2009). Building Acoustics and Vibration, Theory and Practice, World Scientific. TH1725.H38 2009
8. Ingard, K.U. (2010). Noise Reduction Analysis, Sudbury, Mass: Jones and Bartlett Publishers. TD892.I53 2010
9. Maekawa, Z. (2011). Environmental and Architectural Acoustics, 2nd Edition, Spon Press. TH1725.M34 2011
10. Factory and Machinery Act1967. DOSH
11. OSHA Act 154 1994, DOSH
12. Blevins, Robert D. (2015). Formulas for Dynamics, Acoustics and Vibration. Chinchester : John Wiley TA332.B53 2015
13. Bies, David A. (2018). Engineering Noise Control: Theory and Practice. 5th ed., New York: CRC Press Taylor & Francis. TD892.B531 2018
14. Jaramillo, Ana M. (2015). Architectural Acoustics. New York: Routledge. NA2800.J37 2015

BDC 40903 Mechanical and Electrical System

Synopsis

Mechanical and electrical (M&E) system is the engineering of the internal environment and its impact on a building. It essentially brings buildings and structures to life. This course introduces students to operation and monitoring of the mechanical, electrical and public health systems required for the safe, comfortable and environmentally friendly operation of modern buildings. Scope of study includes the impact of M&E, fundamental of building physic, ventilation, fire safety, building transportation, electrical and water supply.

References

1. William, K.Y.T. (2009). Mechanical and Electrical Systems in Buildings, 2nd Edition. New Jersey: Prentice Hall. TH6010.T36 2005.
2. Janis, R.R. (2014). Mechanical and Electrical Systems in Building. 5th Edition. Boston: Pearson. TH 6010. J36.2014
3. Roger, G. (2007). Building Services, Technology and Design. London: Pearson. TX955.G73 1997.
4. Portman, J. (2014). Building Services Design Management. Chichester UK: Wiley Blackwell. TH438.P67. 2014
5. Hall & Roger G. (2009). Building Services Handbook, Incorporating Current Building & Construction Regulations, 5th Edition. Butterworth-Heinemann. TH151.H34 2009.
6. Poertman, J. (2016). Building Services Engineering: After Design, During Construction. UK: John Wiley & Sons. TH438.P67 2016

BDC 41003 Data Science and Artificial Intelligence

Synopsis

This course aims to introduce basic machine learning techniques and their applications in data mining. This course covers various topics, ranging from optimization methods, unsupervised learning to supervised learning, artificial neural networks, as well as their applications in engineering.

References

1. Rogers, S. (2017). A First Course in Machine Learning, 2nd Edition. Boca Raton: Chapman & Hall /CRC Press. Q325.5 .R631 2017
2. Du, Ke-Lin. (2014). Neural Networks and Statistical Learning. New York: Springer. QA76.87 .D84 2014
3. Siddique, N. (2013). Computational Intelligence: Synergies of Fuzzy Logic, Neural Networks, and Evolutionary Computing. Chichester: John Wiley. Q342 .S52 2013
4. Aggarwal, C. (2014). Data classification: Algorithms and Applications. Boca Raton: CRC Press/Taylor. QA76.9.F5 .D37 2014
5. Flach, Peter A. (2012). Machine Learning: The Art and Science of Algorithms That Make Sense of Data. New York: Cambridge University Press. Q325.5.F52 2012
6. Agresti, A. (2013). Statistics: The Art and Science of Learning from Data. N.J: Pearson. QA276.12 .A374 2013
7. Messac, A. (2015). Optimization in Practice with MATLAB for Engineering Students and Professionals. New York: Cambridge University Press. TA174.M388 2015
8. Chapman, S.J. (2016). MATLAB Programming For Engineers. Boston, MA : Cengage Learning QA297 .C42 2016

BDC 41103 Solid Mechanics Simulation

Synopsis

Overview of the finite element analysis in solid mechanics; sketching the models; two- and three-dimensional simulations; Surface and line models; Optimization; Meshing; Buckling and stress stiffening; Modal analysis and transient structural simulations; Nonlinear materials and simulations; Explicit dynamics.

References

1. Howard, C.Q. (2015). Acoustic Analyses using Matlab and ANSYS. Boca Raton: CRC Press. TA365.H68 2015.
2. Alawadhi, Esam M. (2010). Finite Element Simulations using ANSYS. Boca Raton: CRC Press. TA347.F5. A42 2010.
3. Chen, X. (2015). Finite Element Modelling and Simulation with ANSYS Workbench. Boca Raton: CRC, 2015 TA347.F5 .C46 2015.
4. Barbero, Ever J. (2014). Finite Element Analysis of Composite Materials using ANSYS. Boca Raton: CRC Press, Taylor & Francis Group. TA418.9.C6.B37 2014.
5. Dill, Ellis H. (2012). The Finite Element Method for Mechanics of Solids with ANSYS Applications. Boca Raton, Fla.: CRC. QA808.2.D54 2012

BDC 41203 Applied Non-Destructive Testing

Synopsis

Non-Destructive Testing (NDT) is the process of inspecting or evaluating materials, components or assemblies for discontinuities, or differences in characteristics without destroying the serviceability of the part or system. It essentially used in manufacturing, fabrication and in-service inspections to ensure product integrity and reliability, to control manufacturing processes, lower production costs and to maintain a uniform quality level. This course introduces students about principle and applications of the five most frequently used NDT techniques which are Magnetic Particle Testing (MT), Liquid Penetrant Testing (PT), Radiographic Testing (RT), Ultrasonic Testing (UT) and Visual Testing. Scope of this study includes an introduction, related principles and theories, equipment calibration and application of all these techniques.

References

1. Patrick O. Moore. (2019). Non-Destructive Testing Handbook: Liquid Penetrant Testing, 4th Edition, ASNT Publisher.
2. Patrick O. Moore. (2019). Non-Destructive Testing Handbook: Radiographic Testing, 4th Edition, ASNT Publisher.

3. Patrick O. Moore. (2007). Non-Destructive Testing Handbook: Ultrasonic Testing, 3rd Edition, ASNT Publisher.
4. Patrick O. Moore. (2008). Non-Destructive Testing Handbook: Magnetic Testing, 3rd Edition, ASNT Publisher.
5. Chuck, H. (2001). Handbook of Nondestructive Evaluation, 3rd Edition, McGraw Hill Professional.
6. International Atomic Energy Agency. (2018) Training Guidelines in Non-destructive Testing Techniques, Training Course Series No. 67, IAEA, Vienna. Retrieved from: https://www-pub.iaea.org/MTCD/Publications/PDF/TCS-67web.pdf.
7. International Atomic Energy Agency. (2000) Liquid Penetrant and Magnetic Particle Testing at Level 2, Training Course Series No. 11, IAEA, Vienna. Retrieved from: https://www-pub.iaea.org/MTCD/Publications/PDF/TCS-11.pdf

BDC 41303 Project & Risk Management in Oil & Gas Industry

Synopsis

The course is structured to provide the students with the relevant O&G technology and project management knowledge, skills, and tools particularly in the upstream sector. This course provides comprehensive introduction to the O&G industry including the technology, terminology, operations, risk management and economics, as well as providing students with the necessary exposure to the industry. This will hopefully become a value-added knowledge to engineering students to venture into the global O&G industry in the near future.

References

1. Maylor, Harvey (2010). Project Management. 4th ed, Harlow, England ; New York : Financial Times Prentice Hall. [HD69.P75 .M39 2010]
2. Gido Jack & Clements, James P. (2015) Successful Project Management. 6th ed. Stamford, CT: Cengage Learning. [HD69.P75 .G52 2015]
3. Barkley, Bruce T.(2004) Project Risk Management. New York : McGraw-Hill [HD69.P75 .B37 2004]
4. Wysocki. Robert K, Beck. Robert & Crane. David B(2000). Effective Project Management . 2nd ed. New York : John Wiley. [HD69 .W97 2000]
5. Loosemore, Martin (2006). Risk Management for Projects. 2nd ed. London : Taylor and Francis. [TH438 .R57 2006]
6. Jeynes, Jacqueline. (2002). Risk Management : 10 principles. Oxford : Butterworth-Heinemann. [HD61 .J49 2002]
7. Gerardo Portela Da Ponte Jr. (2021). Risk Management in the Oil and Gas Industry: Offshore and Onshore Concepts and Case Studies. 1st ed. Gulf Professional Publishing.
8. Michel Crouhy (2014). The Essentials of Risk Management 2nd ed. Mac Graw Hill Education
9. Andrew Inkpen and Michael H. Moffett (2011), The Global Oil & Gas Industry: Management, Strategy and Finance., London; PennWell Corp. ISBN-139781593709815
10. Ramesh Singh (2017). Pipeline Integrity: Management and Risk Evaluation 2nd ed. Gulf Professional Publishing.
11. Charlotte J. Wright & Rebecca A. Gallun (2008), Fundamentals of Oil & Gas Accounting, (5th Ed.), London; PennWell Corp.
12. Maxwell, Martin & Kramer (2007), Cases and Materials on Oil and Gas (8th Ed.), London: Foundation Press.
13. Martin S. Raymond and William L. Leffler (2005), Oil & Gas Production in Nontechnical Language., London; PennWell Corp.

BDD 40103 Design For Manufacture and Assembly

Synopsis

Introduction to product development, Introduction to DFMA, Selection of materials and processes, Design for assembly (DFA), DFMA for machining, DFMA for injection molding, DFMA for sheet metal working.

References

1. Geoffrey, B., Peter, D., & Winston, K. (2011). Product Design for Manufacture and Assembly, 3rd Edition, CRC Press. TS171.4 .B67 2011
2. Carrado, P. (2001). Design for Manufacturing, Butterworth-Heinemann Pub.
3. Beno, B. (2003). Manufacturing: Design, Production, Automation, and Integration, Marcel Dekker, Inc.
4. Edward, B. M., Satyandra, K. G., & F. Patrick McCluskey (2009). Integrated Product and Process Design and Development: The Product Realization Process, 2nd Edition, CRC Press LLC.
5. Anderson, David M. (2014). Design for Manufacturability: How to use Concurrent Engineering to Rapidly develop Low-Cost, High-Quality Products for Lean Production. CRC Press. TS183 .A57 2014
6. Ganesh, K. (2014). Design and Development of Knowledge Management for Manufacturing: Framework, Solution and Strategy. Springer. HD30.2 .G36 2014

BDD 40203 Computer Aided Design & Manufacturing (CADCAM)

Synopsis

Introduction to CAD/CAM system, Geometric modeling system, Standard between communication systems, Engineering tolerance, Computer Aided Process Planning, Numerical control, Data communications, Local area network, Computer Aided Additive Manufacturing, Computer Aided Quality Control.

References

1. Gu, Ning. (2012). Computational Design Methods and Technologies: Applications in CAD, CAM, and CAE Education. Information Science Reference. TA345.G86 2012
2. Zeid, I., & Sivasubramanian, R. (2010). CAD/CAM: Theory and Practice. 2nd Ed., McGraw Hill.
3. Valentino, J.V., & Goldenberg. (2013). Introduction to Computer Numerical Control. 5th Ed., Prentice Hall. TJ1189.V34 2013
4. Krulikowski, A. (2012). Fundamentals of Geometric Dimensioning and Tolerancing. 3rd Ed., Cengage Learning.
5. Roa, P. N. (2010). CAD/CAM: Principle and Application. 3rd Ed., Tata McGraw Hill Education Pvt. Ltd.,
6. Kumar, L. Jyothish, Pulak M. Pandey, & David Ian Wimpenny. (2018). 3D Printing and Additive Manufacturing Technologies. Springer.

BDD 40303 Rapid Product Development & Manufacturing

Synopsis

Introduction to rapid product development and rapid prototyping, Rapid prototyping processes, Rapid prototyping data format, Liquid based rapid prototyping system, Solid based rapid prototyping system, Powder based rapid prototyping system, Rapid Tooling, Reverse engineering using rapid prototyping, Application in manufacturing.

References

1. Narayan, R. (2014). Rapid Prototyping of Biomaterials: Principle and Applications. Oxford: Woodhead Publishing. R857.M3 .R36 2014
2. Gibson, I., Rosen, D., & Stucker, B. (2014). Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, 2nd Edition, Springer.
3. Douglas, B. (2014). CAD and Rapid Prototyping for Product Design (Portfolio Skills), Laurence King Publishing Ltd, 2014.
4. Narayan, R. (2011). Computer-aided Biomanufacturing. Weinheim: John Wiley. TP248.3 .C65 2011
5. Chua, C.K. (2017). Rapid Prototyping: Principle and Applications. 5th. Edition. Singapore: World Scientific. TS155.6 .C48, 2017
6. Cecil, J. (2010). Virtual Engineering. New York, NY: Momentum Press. TS171.8 .V57 2010

BDD 40503 Reverse & Concurrent Engineering

Synopsis

Principle of concurrent engineering, Environmental concurrent engineering, Scheme for concurrent engineering, Product life cycle, Supplier interaction, Data conversion procedure, Basic principle of reverse engineering, Evaluation and validation, Design validation, Project implementation, Reverse engineering measuring equipment.

References

1. Messler, Robert W. (2014). Reverse Engineering: Mechanisms, Structures, Systems, and Materials. McGraw-Hill Education TA168.5 .M47 2014
2. Das Gupta, Saikat. (2014). Reverse Engineering of Rubber Products: Concepts, Tools, and Techniques. Taylor and Francis. TS1892 .R48 2014
3. Ulrich, K. T., & Eppinger, S.D. (2012). Product Design and Development, 5th Edition, McGraw Hill/Irwin. HD31 .U47 2012.
4. Roa, P. N (2010). CAD/CAM: Principle and Application. 3rd Ed, Tata McGraw Hill Education Pvt. Ltd.
5. Susan, C. (2012). Implementing Concurrent Engineering in Small Companies. Marcel Dekker Inc. TS176 .S52 2002.
6. Anderson, David M. (2014). Design for Manufacturability: How to Use Concurrent Engineering to Rapidly develop Low-Cost, High-Quality Products for Lean Production. CRC Press. TS183 .A57 2014

BDD 40603 Metal Casting Process

Synopsis

Casting process types, Mold making, Sand casting, Sepecial casting, Casting equipment and appliances, Metal melts equipment, Core, Patent, Casting defects and inspection, Design analysis, Product quality, Cleaning/secondary process, Metal casting simulation, Rapid tooling in metal casting.

References

1. Saho, M., Loper, C., & Sahu, S. (2014). Principles of Metal Casting, 3rd Edition, Mc Graw Hill. TS230.S23 2014
2. Swift, K. G., Booker. (2013). Manufacturing Process Selection Handbook: From Design to Manufacture. Oxford, UK; Waltham, MA: Elsevier Butterworth-Heinemann. TS183.3 .S94 2013
3. Yury S. L. & Rao, P. N. (2013). Metal Casting Principles and Techniques, American Foundry Society. (ISBN: 978-0-87433-399-2)
4. Campbell, J. (2011). Complete Casting Handbook: Metal Casting Processes, Metallurgy, Techniques and Design. Oxford, UK; Waltham, MA: Elsevier Butterworth-Heinemann, 2011. TS230.C354 2011
5. Glicksman, M.E. (2010). Principles of Solidification: An Introduction to Modern Casting and Crystal Growth Concepts. London: Springer.

BDD 40703 Modern Machining Process

Synopsis

Chemical Machining, Electrochemical Machining-ECM, Electrical Discharge Machining-EDM, Laser Beam Machining, Electron Beam Machining, Ultrasonic Machining, Water Jet Machining, Abrasive Jet Machining, Ion Beam Machining.

References

1. Kalpakjian, S. (2014). Manufacturing Engineering and Technology. Singapore: Pearson. TS176.K34 2014
2. Hassan Abdel-Gawad El-Hofy (2014). Fundamentals of Machining Processes: Conventional and Nonconventional Processes, 2nd Edition, CRC Press, Taylor & Francis. TJ1185 .H63 2014
3. Rao, P. N. (2013). Manufacturing Technology: Metal Cutting. New Delhi: Mc Graw Hill.

4. Dahotre, N.B. (2011). Laser Machining of Advanced Materials. London, UK; Boca Raton, Fla.: CRC Press/Balkema. TA1675 .D33 2011
5. Singh D. K. (2014). Manufacturing Technology. New Delhi: Ane Books Pvt. Ltd. TA403 .S56 2014
6. Hoffman, Peter J. (2014). Precision Machining Technology. 2nd Edition. Clifton Park, NY: Cengage Learning. TJ1189 .H63 2015

BDD 40803 Manufacturing Control Technology

Synopsis

Manufacturing control system, Control system analysis and modeling, Industrial Control Systems, Computer Control, Automated Material Handling and Identification, Production Planning and Control.

References

1. Mikell, P. G. (2011). Principles of Modern Manufacturing, John Wiley & Sons. TS176 .G76 2011.
2. Hanssen, D.H. (2015). Programmable Logic Controllers, John Wiley & Sons. TJ223.P76.H37
3. Mikell, P.G. (2013). Automation, Production Systems and Computer Integrated Manufacturing. T2183.G76
4. Mukhopadhyay, S.C. (2014). Internet of Things: Challenges and Opportunities, Springer. TK7895.E43.I57
5. Wilson, M. (2015). Implementation of Robot Systems: An Introduction to Robotics, Automation, and Successful Systems Integration in Manufacturing. London: Butterworth-Heinemann. TS191.8.W54

BDD 40903 Injection Mould Design

Synopsis

This course will cover the introduction to injection mould concept and plastic part design. Then, mould layout design, runner design, gating design, ejector design, venting design and cooling system will be introduced in the following chapter. The last two chapters are product defects and cost estimation.

References

1. Pruner, H., & Nesch, W. (2013). Understanding Injection Moulds. Hanser Publication.
2. Gordon, M. J. (2010). Total Quality Process Control for Injection Moulding. Hoboken, N.J.: Wiley. TP1150.G67 2010
3. Rae, R. (2013). Injection Moulding - Tool Design. 2nd Edition.
4. Rodriguez, F., Cohen, C., Ober, C.K., & Archer, L. (2015). Principles of Polymer Systems. 6th Edition, CRC Press, Taylor & Francis Group.
5. Brooks, N. (2011). Advanced Mould Making and Casting. The Crowood Press Ltd.
6. Kennedy, P., & Zheng, R. (2012). Flow Analysis of Injection Moulds. 2nd Edition, Hanser Gardner Publication.

BDD 41003 Quality Management

Synopsis

This course consists of Total Quality Management, Business Excellence, and Problem Solving for Quality Improvement, Management System Standards, ISO9001 Quality Management System, Risk Management, and Statistical Process Control.

References

1. Dale, H. B. (2003). Total Quality Management, 3rd Ed., Prentice Hall. HD62.15.T67 2003 n.1
2. Howard, S.G. (2005). Quality Management, 3rd Ed., McGraw-Hill. TS156 .Q34 2005
3. Rosmaini, T. (2013). Total Quality Management, Penerbit UTHM HD62.15 .R68 2013 a
4. Kanisha, B. (2006). Quality Management, Oxford University Press. HD62.15 .B43 2006
5. David, G. (2010). Operations Management for Business Excellence, Pearson. HF5429 .G37 2010

BDD 41103 Human Factor Engineering

Synopsis

This course introduces students to knowledge and skills in human factors and ergonomics. Scopes of study includes introduction to ergonomics, physical and personal factors, cumulative trauma disorder, manual material handling, environmental factors, workplace design, equipment design and ergonomics risk assessment and program.

References

1. John, R. W., Beverley, N., Theresa, C., & Ann, M. (2005). Rail Human Factors: Supporting the Integrated Railway, ASHGATE. TF145 .R34 2005
2. Christopher, D.W., John, D.L., Yili, L., & Sallie E.G. (2004). An Introduction to Human Factors Engineering, International Edition, Pearson-Prentice Hall. TA166 .W52 1999 N1
3. Dennis, A.A., Joseph, M.D., & Mary E.Danz-Reece. (2004). Ergonomics Solutions for the Process Industries, Elsevier .TA166.A87 2004
4. Karl, K., Henrike, K., & Katrin, Kroemer-Elbert. (2001). Ergonomics: How to Design for Ease and Efficiency, 2nd edition, Prentice Hall. TA166 .K76 2001 N1
5. Benjamin, N., & Andris, F. (2003). Methods, Standards & Work Design, 11th edition, McGraw-Hill. T60.8 .F73 2009
6. Edited by Waldemar, K. (2006). Handbook on standards and guidelines in ergonomics and human factors, Lawrence Erlbaum Associates. TA166 .H36 2006
7. The Eastman Kodak Company. (2004). Kodak's Ergonomic Design for People at Work, 2nd edition, John Wiley. T59.7 .K62 2004
8. Mark S.S., & Ernest J. M. (1993). Human Factors in Engineering and Design, 7th Edition, McGraw-Hill.
9. Bridger, R.S. (2003). Introduction to Ergonomics, 2nd edition, Taylor and Francis. TA166.B74 2009

BDE 40103 AirCond System Design

Synopsis

Introduction to refrigeration plant and air conditioning use. Refrigeration cycle and air. Thermal comfort. Heat load estimate (Refrigeration). Air distribution and ducting system. Recovery air conditioning system. Control the Noise in refrigerant plant. Design project for Air conditioning system.

References

1. Kaushik, S.C. (2016). Alternatives in Refrigeration and Air Conditioning. India: I K International Publish. TP492.K38 2016
2. Gupta, N.C. (2016). Comprehensive HVAC System Design: A Handbook on Practical Approach to Air Conditioning, Heating and Ventilation Systems. New Delhi: MV Learning. TH7345.G86 2016
3. Smith, Russell E. (2015). Electricity for Refrigeration, Heating and Air Conditioning. Clifton Park. NY: Cengage Learning. TK153 .S64 2015
4. Kleinert, Eric. (2015). HVAC and Refrigeration Preventive Maintenance. New York: McGraw-Hill. TH7015 .K53 2015
5. Nihal E Wijeysundera (2016). Principles of Heating, Ventilation and Air Conditioning with Worked Examples. XX(171406.1)
   Retrieved from: https://www.worldscientific.com/worldscibooks/10.1142/9562#t=toc

BDE 40203 Energy Management and Conservation

Synopsis

Background of energy, non-renewable energy, renewable energy, energy efficiency and conservation, Malaysian Standard MS1525:2014, energy audit, measurement and verification and industrial oriented energy management project.

References

1. Francis, M.V., & Louis, D.A. (2016). Energy Systems Engineering: Evaluation and Implementation, 3rd Edition, McGraw-Hill.
2. Smith, Craig B. (2016). Energy Management Principles: Applications, Benefits, Savings. 2nd Edition. Amsterdam: Elsevier. TJ163.3 .S65 2016
3. Stephan, A.R., Steve, D., & Wayne, C.T. (2018). Energy Management Handbook, 9th Edition. Boca Raton, FL: Taylor & Francis.
4. Moaveni, S. (2018). Energy, Environment, and Sustainability. Boston: Cengage Learning. HC79.E5.M62 2018
5. Suruhanjaya Tenaga (2017). Malaysia Energy Statistics: Handbook. Putrajaya: Suruhanjaya Tenaga. HD9502.A2 .M35 2017
6. M&V Guidelines. (2015). Measurement and Verification for Performance-Based Contracts Version 4.0, US Department of Energy.

BDE 40303 Turbomachinery

Synopsis

This course covers the fundamentals, basic design and analysis of turbomachines. The course content starts with the fundamental principles followed by its application in various turbomachines which include Hydraulic Pumps and Turbines, Axial Flow Compressors, Centrifugal Compressors, Axial Flow Turbines and Radial Flow Turbines.

References

1. Perez, Robert X. (2016). Troubleshooting Rotating Machinery. Hoboken. New Jersey: John Wiley & Sons. TJ153.P47 2016
2. Terry Wright, Philip M. Gerhart, (2010) Fluid machinery: Application, Selection, and Design (2nd Edition), CRC Press, TJ267.W74 2010
3. Dixon, S.L., & Hall, C.A., (2014) Fluid Mechanics and Thermodynamics of Turbomachinery (7th Edition), Butterworth Heinemann. TJ267.D59 2014
4. Roma S. R. Gorla, Aijaz A. Khan, (2003) Turbomachinery: Design and Theory, Marcel Dekker, TJ267.G67 2003
5. Seppo A. Korpela, (2011) Principles of Turbomachinery (1st Edition), Wiley, TJ267.K67 2011
6. Earl Logan, (1993) Turbomachinery: Basic Theory and Applications, Marcel Dekker, TJ267.L63 1993

BDE 40403 Computational Fluid Dynamics

Synopsis

This course is designed to provide an insight into the fundamentals of Computational Fluid Dynamics (CFD), the steps involved in the CFD process and the application of CFD in basic engineering problems. The CFD course content include introduction of CFD, the governing equations of fluid flow, numerical methods in CFD, turbulence modeling and applications of CFD.

References

1. John, D.R. (2014). Elements of Computational Fluid Dynamics, Wichita. Kansas: Engineering Education System. QA911.R36 2014
2. Chung, T.J. (2014). Computational Fluid Dynamics. Australia: Cambridge University Press. QA911 .C48 2014
3. Yu, Kuo-Tsong (2014). Introduction to Computational Mass Transfer. Heidelberg: Springer. TP156.M3 .Y84 2014
4. Forest, Maria (2015). Computational fluid Dynamics: Concepts and Applications. New York: NY Research Press. TA358 .C65 2015
5. Anderson, J.D. (1995). Computational Fluid Dynamics: The Basics with Applications. New York: McGraw-Hill. QA911.A53 1995

6. Versteeg, H.K., & Malalasekera, W. (2007). An Introduction to Computational Fluid Dynamics: The Finite Volume Method, 2nd Edition, Essex, Longman Scientific & Technical. QA911.V47 2007

BDE 40503 Fluid Power

Synopsis

Introduction to fluid power; the components, designs and maintenance of the hydraulic and pneumatic circuits; source, effect and control of pollution in a hydraulic system.

References

1. Anthony, E. (2009). Fluid Power with Applications, 7th ed., Pearson. TJ843.E86 2009
2. Akers, A. (2006). Hydraulic Power System Analysis, Taylor and Francis. TJ843. A43 2006
3. Manring, N. (2014). Fluid Power Pumps and Motors: Analysis, Design, and Control. New York: McGraw-Hill Education. TJ915.M36 2014
4. Totten, G.E. (2012). Handbook of hydraulic fluid technology. Boca Raton, FL: CRC Press. TJ843.H36 2012
5. Erbisti, Paulo C. F. (2014). Design of Hydraulic Gates. 2nd Edition. Leiden: CRC Press. TC169 .E72 2014

BDE 40603 Internal Combustion Engine

Synopsis

This course discusses the operation and designs of various types of internal combustion engines (ICE), using the application of thermodynamics, parameters that influence the engine performance, engine testing and also discussion on the effects of ICE to the environment; with focus on ICE for automotive applications. Topics in this course include: Introduction on ICE, Concept of Hybrid Engine, Engine Cycles, Spark Ignition Engines, Compression Ignition Engines, Conventional and Alternative Fuels for ICE, Emissions, and ICE testing.

References

1. Khalid, A. (2017). Combustion Control Strategies: Internal Combustion Engines: Series 1. Batu Pahat: Penerbit UTHM. HD2902.6 .C65 2017 a
2. Khalid, A. (2017). Combustion Control Strategies: Internal Combustion Engines: Series 2. Batu Pahat: Penerbit UTHM. QD516 .C67 2018 a
3. Basshuysen, R.V., & Fred S. (2004). Internal Combustion Engine Handbook, SAE International. TJ755.I57 2004
4. James, R.S. (2011). Mechanical Efficiency of Heat Engines, Reissue Edition, Cambridge University Press. TJ255.S46 2007
5. Chris, M., Abul, M.M., & David, W.G. (2011). Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives, Wiley. TL221.15 .M52 2011

BDE 40703 Engineering Maintenance and Safety

Synopsis

Maintenance and Safety Engineering will discuss about basic principles of safety and how to reduce the accidents risk. This subject also will discuss about maintenance program shall conduct in plant.

References

1. Richardson, D.C. (2014). Plant Equipment and Maintenance Engineering Handbook. New York: McGraw-Hill. TS191.R52 2014
2. Fennimore, J.P. (2014). Sustainable Facility Management: Operational Strategies for Today. Boston: Pearson. TS155. F46 2014
3. Gulati, R. (2013). Maintenance and Reliability Best Practices, 2nd Ed. New York: Industrial Press. TA168.G84 2013
4. Jardine, A.K.S. (2013). Maintenance, replacement and reliability: theory and applications, 2nd Edition. Boca Raton: CRC. TS192.J37 2013

5. Hartnett, G. (2012). Handbook of Maintenance Management & Maintenance. Nottingham: Auris Reference. TS192.H37 2012
6. Occupational Safety and Health Act and Regulations. (2001). MDC Publishers Printer Sdn. Bhd. KPG1390.M34 2001.
7. Factories and Machinery Act & Regulations. (2001). MDC Publishers Printer Sdn. Bhd. KPG1390.A31967. A4 2001 rw N1

BDE 40803 Aerodynamics

Synopsis

Introduction to aerodynamic, aerodynamic general principle and equation, vortex and lift force, flow at cylinder, boundary layer, Reynolds number, Kutta-Jackowki theorem, lift force at airfoil, drag force analysis, subsonic and supersonic flow, Mach number.

References

1. Sengupta, Tapan Kumar. (2015). Theoretical and Computational Aerodynamics. Chichester: John Wiley. TL570 .S46 2015
2. Hansen, Martin O. L. (2015). Aerodynamics of Wind Turbines. 3rd Edition. New York: Routledge. TJ828 .H36 2015
3. Anderson, J.D. (2016). Introduction to Flight, 8th Edition, Mc Graw Hill. TL570.A68 2016
4. Cummings, Russell M. (2015). Applied Computational Aerodynamics: A Modern Engineering Approach. NY: Cambridge. TL574.F5 .C86 2015
5. Anderson, J. (2011). Fundamental of Aerodynamic, 5th Edition, Mc Graw Hill. TL570.A525 2011
6. Rathakrishnan, E. (2013). Theoretical Aerodynamics, John Wiley & Sons. TL570.R37 2013

BDE 40903 Thermal Environmental Design

Synopsis

Human factor in environment control, new development in comfort, heat and body, ventilation and indoor air quality, field works and laboratory works.

References

1. Cengel, Y.A. & Boles, M.A. (2015). Thermodynamics: An Engineering Approach, 8th Edition. McGraw-Hill. TJ265.C46 2015).
2. Parsons, Ken (2014). Human Thermal Environments. 3rd Edition. Boca Raton, FL: Taylor & Francis. QP82.2.T4 .P38 2014
3. Smith, Russell E. (2015). Electricity for Refrigeration, Heating and Air Conditioning. Clifton Park, NY: Cengage Learning. TK153 .S64 2015
4. Jan, F.K., & Ari, R. (2002). Heating and Cooling of Buildings: Design for Efficiency, 2nd Edition, McGraw Hill. TH7345.K73 2002 N2
5. Venkanna, B.K. (2011). Applied Thermodynamics. New Delhi: PHI Learning. TJ265.V46 2011

BDE 41003 Automotive Propulsion

Synopsis

This course discusses the operation, designs and performance of conventional internal combustion engines (ICE); low-carbon propulsions and introduction to vehicle electrification. Topics in this course include: Engine cycles, spark ignition engines, compression ignition engines, fuels for ICE, turbo-charging, advanced technologies for ICE, pollutants formation and control, hybrid powertrain, vehicle electrification and powertrain testing.

References

1. Khalid, A. (2017). Combustion Control Strategies: Internal Combustion Engines: Series 1. Batu Pahat: Penerbit UTHM. HD2902.6 .C65 2017 a
2. Khalid, A. (2017). Combustion Control Strategies: Internal Combustion Engines: Series 2. Batu Pahat: Penerbit UTHM. QD516 .C67 2018 a

3. Shekhar, Himanshu (2013). Aircraft and Automobile Propulsion: A Textbook. Oxford: Alpha Science International. TJ755 .S53 2013
4. Pulkrabek, W. W. (2004). Engineering Fundamentals of the Internal Combustion Engine, 2nd Edi. Upper Saddle River, NJ: Pearson Education.TJ785.P84 2004
5. Ganesan, V. (2012). Intenal Combustion Engines, 4th Edition, New Delhi: Tata McGraw-Hill.TJ755. G36 2012
6. Martyr, A.J. & Plint, M.A. (2007). Engine Testing: Theory and Practice, 3rd Edition. Oxford: Butterworth - Heinemann. TJ759.M37 2007

BDE 41103 Indoor Environmental Quality

Synopsis

Human comfort, new development in human comfort studies, noise and lightning, ventilation and indoor air quality, field works and laboratory works.

References

1. Parsons, Ken (2014). Human Thermal Environments. 3rd Edition. Boca Raton, FL: Taylor & Francis. QP82.2.T4 .P38 2014
2. Smith, Russell E. (2015). Electricity for Refrigeration, Heating and Air Conditioning. Clifton Park. NY: Cengage Learning. TK153 .S64 2015
3. Bearg, D.W. (1993). Indoor Air Quality and HVAC System. Florida: CRC Press LLC. TH7015. B42 1993
4. Burroughs, H. E., & Hansen, S.J. (2011). Managing Indoor Air Quality, 5th ed., Boca Raton: Fairmont Press. TD883.1. B87 2011
5. Nicol, F., Humpreys, M., & Roaf, S. (2012). Adaptive Thermal Comfort. New York: Routledge. TH6025. N52 201
6. ANSI/ASHRAE Standard 55-2013: Thermal Environmental Conditions for Human Occupancy. Open source reference
7. ISO 7730:2005 Ergonomics of the thermal environment Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria. Open source reference
8. Malaysian Department of Occupational Safety and Health Industry Code of Practice on Indoor Air Quality 2010. Open source reference
9. Malaysian Department of Occupational Safety and Health Guidelines on Heat Stress Management at Workplace 2016. Open source reference

BDE 41203 Gas Turbine Technology

Synopsis

An Overview of Gas Turbine, Theoretical an actual Cycle Analysis, Compressor and Turbine Performance Characteristic, Compressors, Turbines, Combustors, Fuel System for Gas Turbine, Gas Turbine Auxiliary and Design of Simple Gas Turbine.

References

1. Giampaolo, Tony. (2014). Gas Turbine Handbook: Principles and Practice, 5th Edi., Lilburn: The Fairmont Press. TJ778.G52 2014
2. Boicea, Valentin A. (2014). Essentials of Natural Gas Microturbines. TK1076 .B64 2014
3. Han, Je-Chin. (2013). Gas Turbine Heat Transfer and Cooling Technology, 2nd Edi., Boca Raton: CRC Press. TJ778.H26 2013
4. Boyce, M.P. (2012). Gas Turbine Engineering Handbook, 4th Edi., Bosto, Elsevier/Butterworth-Heinemann. TJ778.B69 2012
5. Lefebvre, A.H. (2010). Gas Turbine Combustion: Alternative Fuels and Emissions, 3rd Edi., Boca Raton: Taylor & Francis TJ778.L434 2010
6. Saravanamuttoo, H.I.H. (2009). Gas Turbine Theory, 6th Edi., Harlow: Prentice Hall. TJ778.G37 2009

BDE 41403 Heat Exchanger Process

Synopsis

Heat exchangers are used extensively in various industries including oil & gas, power plants, process plants, refrigeration & cooling, automotive, aeronautics, electronics and many more. The performance of heat exchangers is important for cost and efficiency of operations and for environmental aspects. This course aims at reviewing and extending the existing knowledge in the subject of heat exchangers by providing overview to the design and analysis of different heat exchanger types, with specific focus on the hydro and thermodynamic concepts and analysis.

References

1. Andrè Garcia McDonald & Hugh Magande (2012) Introduction to Thermo-Fluids Systems Design (1st Edition). John Wiley & Sons, West Sussex. [TJ263 .M36 2012]
2. Eduardo Cao (2010) Heat Transfer in Process Engineering. McGraw-Hill, New York. [TP363 .C36 2010]
3. HoSung Lee (2010) Thermal Design: Heat sinks, Thermoelectrics, Heat Pipes, Compact Heat Exchangers and Solar Cells. John Wiley & Sons, New Jersey. [TJ255.5 .L43 2010]
4. Lieke Wang, Raj M. Manglik & Bengt Sundén (2007) Plate Heat Exchangers: Design, Applications and Performance, WIT Press, Southampton. [QC323 .P52 2007]
5. Maurice Stewart & Oran T. Lewis (2013) Heat Exchanger Equipment Field Manual: Common Operating Problems and Practical Solutions (1st Edition), Gulf Professional Publishing, Massachusetts. [TJ263 .S73 2013]
6. Ramesh K. Shah & Dusan P. Sekulic (2003) Fundamentals of Heat Exchanger Design. John Wiley & Sons, New Jersey. [TJ263 .S52 2003]
7. Robert W. Serth (2007) Process Heat Transfer: Principles and Applications. Academic Press, Massachusetts. [QC320 .S47 2007]
8. Van P. Carey (2007) Liquid Vapor Phase Change Phenomena: An Introduction to the Thermophysics of Vaporization and Condensation Processes in Heat Transfer Equipment (2nd Edition). Taylor and Francis, New York. [TJ263 .C37 2007]
9. William S. Janna (2015) Design of Fluid Thermal Systems (4th Edition). Cengage Learning, Connecticut. [TJ930 .J36 2015]
10. Yunus A. Cengel & Afshin J. Ghajar (2015) Heat and Mass Transfer: Fundamentals and Applications. McGraw-Hill, New York. [TJ260 .C46 2015]

Career and Further Education Prospect

Mechanical engineers are involved in the design, testing, inspection and manufacturing of various machines and devices including, parts in various transport vehicles, electronic devices, buildings, industrial plants and medical devices and many other systems.

Mechanical engineers typically do the following:

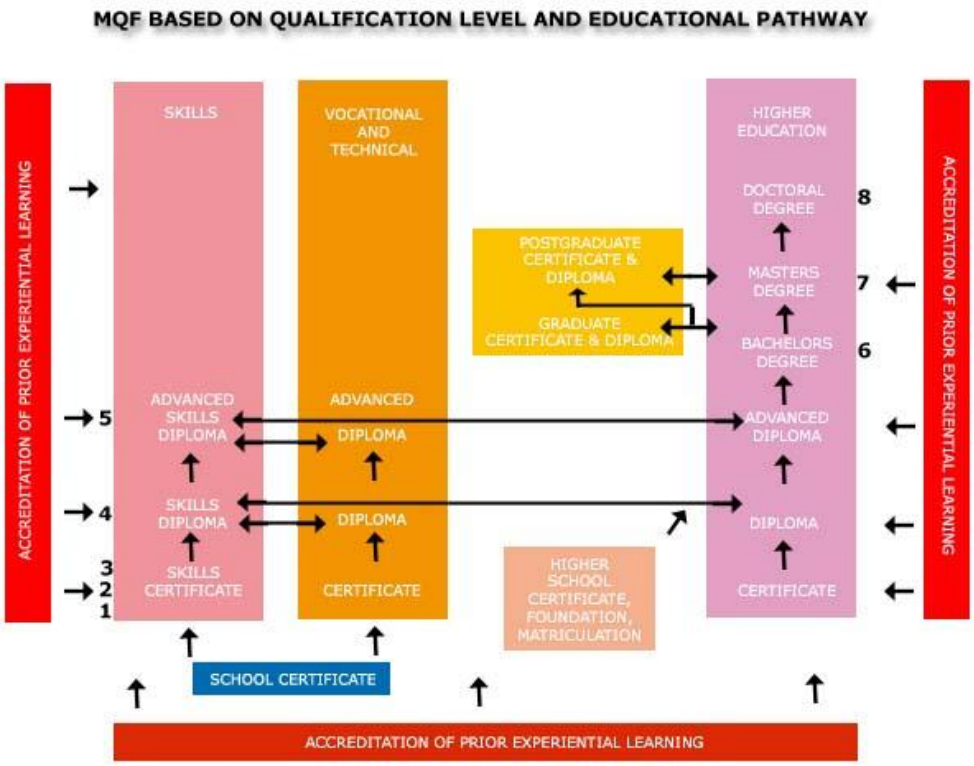
- Analyse problems to see how mechanical devices
- Design or redesign mechanical devices based on analysis and computer-aided design
- Develop and test prototypes of devices they design
- Analyse the test results and change the design as needed
- Oversee the manufacturing process for the device

Their role is central to ensuring the safe, timely and well-resourced completion of projects in many areas, including:

- Machinery manufacturing
- Equipment and energy industry
- Computer and electronic product industry;
- Materials and computer-aided engineering
- Testing laboratories
- Process control

The Mechanical Engineer is responsible to perform engineering duties in planning, overseeing installations, operations, maintenance, and repair of equipment. They have the opportunities work in professional office or industrial settings and visit worksites whenever a problem or an equipment requires their attention.

Further Education Pathway Example:



Source: Malaysian Qualification Framework

MALAYSIAN QUALIFICATIONS FRAMEWORK: QUALIFICATIONS AND LEVELS

MQF Levels	Sectors			Lifelong Learning
	Skills	Vocational and Technical	Higher Education	
8			Doctoral Degree	Accreditation of Prior Experiential Learning (APEL)
7			Masters Degree	
			Postgraduate Certificate & Diploma	
6			Bachelors Degree	
			Graduate Certificate & Diploma	
5	Advanced Diploma	Advanced Diploma	Advanced Diploma	
4	Diploma	Diploma	Diploma	
3	Skills Certificate 3	Vocational and Technical Certificate	Certificate	
2	Skills Certificate 2			
1	Skills Certificate 1			

Source: Malaysian Qualification Framework

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