

**BACHELOR OF MECHANICAL ENGINEERING
WITH HONOURS (BDD)**

Bachelor of Mechanical Engineering With Honours
Faculty of Mechanical and Manufacturing Engineering

YEAR	CODE	SEMESTER I		CREDIT	CODE	SEMESTER I		CREDIT	CODE	SEMESTER I		CREDIT
		SUBJECT				SUBJECT				SUBJECT		
1	BDA 10102	Engineering Drawing	2	BDA 10302	Material Science	2						
	BDA 10203	Statics	3	BDA 10402	Solid Mechanics I	2						
	BDA 18001	Mechanical Engineering Practice I	1	BDA 10502	Fluid Mechanics	2						
	BWM 10103	Engineering Mathematics I	3	BDA 17001	Engineering Laboratory I	1						
	UWB 10101	English for Academic Purposes	1	BDA 18101	Mechanical Engineering Practice II	1						
	UWS 10103	Asian Nationhood & Current Develop't /	3	BEX 17003	Electric and Electronic Technology	3						
	UWS 10303	Malaysia Studies and Culture	2	BWM 10203	Engineering Mathematics II	3						
	UWB 20402	Creativity & Innovation	2	UWA 10302	Islam Civilisation and Asian Civilisation	2						
	UQ* 1**01	Co-Curriculum I	1	UWB 10202	Effective Communication	2						
			16			18						
2	BDA 20103	Dynamics	3	BDA 20303	Mechanics of Machine	3						
	BDA 20202	Thermodynamics I	2	BDA 20402	Engineering Materials Selection	2						
	BDA 27001	Engineering Laboratory II	1	BDA 20502	Computer Aided Design	2						
	BWM 20403	Engineering Mathematics III	3	BDA 27101	Engineering Laboratory III	1						
	BTI 10202	Computer Programming	2	BDA 27201	Engineering Laboratory IV	1						
	UWB 1**02	Foreign Language	2	BDA 28001	Mechanical Engineering Practice III	1						
	UWA 10102	Islamic Studies /	2	BWM 20502	Engineering Statistics	2						
	UWA 10202	Moral Studies	2	UWS 10202	Ethnic Relationship /	2						
	UWB 20302	Technical Writing	2	UWB 11202	Malay Language	1						
			17			15						
3	BDA 30203	Fluid Mechanics II	3	BDA 28101	Mechanical Engineering Practice IV	1	BDA 38004	Industrial Training		4		
	BDA 30303	Solid Mechanics II	3	BDA 30502	Manufacturing Technology	2						
	BDA 30403	Thermodynamics II	3	BDA 30603	Heat Transfer	3						
	BDA 37001	Engineering Laboratory V	1	BDA 30703	Control Engineering	3						
	BWM 30603	Engineering Mathematics IV	3	BDA 30803	Mechanical Engineering Design	3						
	BPK 20802	Entrepreneurship	2	BDA 37101	Engineering Laboratory VI	1						
	BPK 30902	Engineering Economy	2									
		17			13			4				
4	BDA 40102	Industrial Engineering	2	BDA 40402	Management and Professional Ethics	2						
	BDA 40203	Engineering Design	3	BDA 40502	Engineers & Society	2						
	BDA 40303	Finite Element Method	3	BDA 49104	Bachelor Degree Project II	4						
	BDA 49002	Bachelor Degree Project I	2	BD* 4**03	Elective II	3						
	BDA 40603	Noise and Vibration	3	BD* 4**03	Elective III	3						
	BD* 4**03	Elective I	3									
		16			14							
TOTAL CREDIT										130		

YEAR 1

**YEAR 1
SEMESTER I**

BDA 10102 ENGINEERING DRAWING

SYNOPSIS :

Introduction of engineering drawing: Equipment and material uses. Drawing standard. Lettering and lines. Dimension lines. Plane geometry. Orthographic projection view. Cross section view. Orthographic projection drawing. Cross section view. Isometric, oblique and perspective drawing. Mechanical drawing of single component. Ordinary routines and convention. Bolt, screw and nut. Tolerance, limit and assembly. Surface texture. Welding. Introduction of drawing aided by computer software. Drawing command and two dimension drawing (2D).

REFERENCE(S):

1. Mohd. Fadzil Daud, Khairul Anuar Hanafiah, (2000), "*Panduan Asas Lukisan Kejuruteraan*", Universiti Teknologi Malaysia.
2. Khairul Anuar Hanafiah (2006), "*Lukisan Kejuruteraan Berbantu Komputer – Edisi Kedua*", Universiti Teknologi Malaysia, Johor, Malaysia.
3. A.W. Boundy, (2002), "*Engineering Drawing - Six Edition*", Mc.Graw Hill.
4. Gieseckle, Mitchel. Hill (2000), "*Engineering Graphics*", Seventh Edition, Prentice Hall, Prectice Hall.

BDA 10203 STATICS

SYNOPSIS :

This course introduces students to the basic principles and concepts of engineering mechanics (static) and its application in the field of engineering. Student will be taught the basic concept such as Introduction to static, static of particles, static of rigid bodies, centroids and centre of gravity, analysis of structures and friction.

REFERENCE(S) :

1. Hibbeler R. C., 2006. "Engineering Mechanics: Statics SI Pack", 11th Edition, Singapore: Pearson Education.

2. Bear F. P., E. R. Johnston, E. R. Eisenberg; with the collaboration of D. F. Marzuek, 2007. "Vector Mechanics for Engineers: Statics ", 8th Edition, Boston, MA: McGraw-Hill
3. Meriam J. L. and Kraige L.G., 2007. "Engineering Mechanics: Statics", 6th Edition, Hoboken, NJ: John Wiley
4. Mohd Imran Ghazali dan Mohd Shukor Abu Hassan, 2002. "Mekanik Kejuruteraan : Statik : Teori, Contoh Penyelesaian dan Masalah", Jilid 1 & 2, Penerbit UTM.

BDA 18001 MECHANICAL ENGINEERING PRACTICE I

SYNOPSIS :

Safety in engineering workshop, fitting, welding, turning, milling, grinding and sheet metal fabrication.

REFERENCE(S):

1. Richard R. Kibbe, John E. Neely, Roland O. Meyer, Warren T. White, 2006, "Machine Tool Practices", 8th. Edition, Prentice Hall.
2. Serope Kalpakjian and Steven R. Schmid, 2006, "Manufacturing Engineering and Technology", 5th. Ed., Prentice Hall.
3. P. N. Rao, 2001, "Manufacturing Technology", 2nd. Ed., McGraw Hill.
4. Baldev Raj, V. Shankar, A. K. Bhaduri, 2006, "Welding Technology for Engineers", Alpha Science.

UWB 20302 TECHNICAL WRITING

SYNOPSIS :

SYNOPSIS :

This course introduces students to report writing skills needed at tertiary level. Students will learn basic report writing skills such as proposals, progress report, informational and analytical reports. In order to do this, they will learn how to collect data using questionnaires. The data collected will be analyzed, transferred into graphic forms and presented orally and in writing. Based on the analysis of data, students will be able to draw conclusions and make recommendations.

REFERENCE(S):

1. Finkelstein, J. (2008). *Pocket Book of technical writing*. 3rd ed. Singapore: McGraw Hill
2. Kolin, P. C. (2006). *Successful writing at work*. Concise ed. USA: Houghton Mufflin Company.
3. Salbiah Seliman et. al. (2004). *English Communication for learners in engineering*. Malaysia: Prentice Hall.
4. Lakshmy Anantha Krishnan et. al. (2003). *Engineering your report: From start to finish*. Singapore: Prentice Hall
5. Gerson, S. J. & Gerson, S. M. (2003). *Technical writing: Process and product*. 3rd ed. New Jersey: Prentice Hall.

UWB 10302

ISLAMIC AND ASIAN CIVILISATION

The course discusses the introduction of civilization, its development, the interaction between civilizations; the Islamic civilization, Islam in the Malay civilization; Indian and Chinese civilizations as well as contemporary civilization issues and also the principles of Islam Hadhari.

REFERENCE(S):

1. Ahmad Hakimi Khairuddin dan Faridah Che Husain. 2006, Isu-isu Kontemporari Dalam Tamadun Islam dan Tamadun Melayu, dalam *Tamadun Islam dan Tamadun Melayu*. Siri Teks Pengajian Tinggi. Kuala Lumpur: Penerbit Universiti Malaya
2. Ibnu Khaldun, Muqaddimah Ibnu Khaldun.
3. Huntington, S. *The Clash of Civilizations and the Remaking of the World Order*. Mahyuddin
4. Hj. Yahaya, 1998 *Tamadun Islam*, Shah Alam: Penerbit Fajar Bakti Sdn. Bhd.
5. Bei Ye. 2001. *Zhongguo Wenming Lun – Zhongguo Gudai Wenming De Benzhi Yu Yuanli* (Bicara Tamadun Cina – Teori dan Asas Tamadun Kuno Cina), Penerbit: Zhongguo Shehui Kexue Chubanshe Beijing.

UQ* 1*1**

CO-CURRICULUM

SYNOPSIS :

Matapelajaran ini ditawarkan dalam bentuk pelbagai aktiviti pilihan untuk pelajar peringkat Sarjana Muda dan Diploma. Tiga bidang aktiviti yang ditawarkan adalah Sukan & Rekreasi, Kelab/Persatuan dan Persatuan Beruniform.

BWM 10103 : ENGINEERING MATHEMATICS I

SYNOPSIS

Limits and Continuity: Techniques of finding limits. Continuity.
Differentiation and Applications: Techniques of differentiation: product rule, quotient rule. Chain rule. Implicit differentiation. Higher derivatives. Differentiation of implicit functions, parametric equations and inverse functions. Applications: rates of change, maximum and minimum problems, sketching rational functions. **L'Hopital's Rule:** Indeterminate form of type $0/0$, ∞/∞ , $0 \cdot \infty$, 0^0 , ∞^0 , 1^∞ , $\infty - \infty$.
Integration: Techniques of integration: integration by substitution, integration by parts, integrating rational functions, integrating power of trigonometric functions, rational functions of sine and cosine, integrating hyperbolic functions and integration by trigonometric and hyperbolic substitution. **Further Differentiation and Integration and Applications:** Derivatives and integrals involving inverse trigonometric and hyperbolic functions. Applications: arc length, surface area of revolution, curvature. **Power Series:** Convergence test. Conditional and absolute convergence. Power series: Taylor and Maclaurin series. Differentiation and integration of power series.

REFERENCE(S):

1. Anton, H., Bivens, I., Davis, S. (2005) *Calculus*. 8th Ed. USA: John Wiley & Sons, Inc.
2. Smith, R. T., Minton, R. B. (2006) *Calculus Concept & Connection*. New York: McGraw-Hill.
3. Abd. Wahid Md. Raji, Hamisan Rahmat, Ismail Kamis, Mohd Nor Mohamad, Ong, C.T. (2003) *Calculus* Malaysia: UTM Publication.
4. Larson, R. E., Hostetler, R. P., Edward, B. H. (1998) *Calculus with Analytic Geometry*. 6th Ed. USA: Houghton Mifflin Company.
5. Thomas, G. B., Finney, R. L. (1996) *Calculus and Analytic Geometry*. 9th Ed. USA: Addison- Wesley Publishing Company.
6. Edward, C. H., Penney, D. E. (1998) *Calculus*. 5th Ed. USA: Prentice-Hall, Inc.
7. Stroud, K. A., Booth, D.J. (2007) *Engineering Mathematics*. 6th Ed. US: Palgrave Macmillan

UWB 10101 ENGLISH FOR ACADEMIC PURPOSES

SYNOPSIS

English for Academic Purposes focuses on fulfilling students' academic requirements, such as the acquisition of reading, writing, speaking and listening skills in English. The course also provides opportunities for students to acquire note taking and study skills. Students will be reinforced on aspects of English language oral and written skills that are most relevant to them in their academic work. By the end of the course, students should be able to use English for a wide range of academic activities.

REFERENCE(S):

1. Koh Soo Ling (2007). *Effective Text for MUET*. Ilmu Bakti Sdn. Bhd.
2. Azian Abd. Aziz (2006) *English for Academic Communication*. Mc Graw Hill Malaysia
3. Noreha Taib (2003). *Basic English*, 2nd Ed. Mc Graw Hill Malaysia
4. Harbans Kaur (2005). *Explore MUET*. Fajar Bakti Sdn. Bhd

UWS 10103 NATIONHOOD AND CURRENT DEVELOPMENT IN MALAYSIA

SYNOPSIS

This course will provide 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 colonisation, 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 be able to appreciate the roles and responsibilities of a good citizen to the country.

REFERENCE(S):

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. Ahmad Esa, Harliana Halim, Khairul Azman Mohd Suhaimy, Ku Hasnan Ku Halim, Marwan Ismail, Mohd Akbal Abdullah, Shamsaadal Sholeh Saad dan Zahrul Akmal Damin (2004). *Ikhtisar Sejarah Kenegaraan & Pembangunan Malaysia*. Johor Bahru: Muapakat Jaya Percetakan Sdn. Bhd.
3. Kassim Thukiman (2002). *Malaysia: Perspektif Sejarah dan Politik*. Skudai: Penerbit Universiti Teknologi Malaysia.
4. Nazaruddin Mohd Jali, Ma'rof Redzuan, Asnarulkhadi Abu Samah dan Ismail Mohd Rashid (2005). *Pengajian Malaysia*. Petaling Jaya: Prentice Hall.
5. Ruslan Zainudin, Mohd Mahadee Ismail dan Zaini Othman (2005). *Kenegaraan Malaysia*. Shah Alam: Fajar Bakti.

UWS 10303 MALAYSIAN STUDIES AND CULTURE

SYNOPSIS:

This course will provide students in depth the 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.

REFERENCE(S):

1. Abdul Halim Nasir. (2004). *Mosque Architecture in the Malay World*. Bangi: Penerbit Universiti Kebangsaan Malaysia.
2. *Ensiklopedia Sejarah Kebudayaan Melayu*. (1998). Kuala Lumpur: Dewan Bahasa dan Pustaka.
3. Khoo Kay Kim. (2001). *Malay Society: Transformation and Democratisation*. Kelana Jaya: Pelanduk Publications
4. Nazaruddin Mohd. Jali. (2003). *Malaysian Studies: Nationhood and Citizenship*. Petaling Jaya: Pearson Prentice Hall.

5. Yahaya Ismail. (1989). *The Cultural Heritage of Malaysia*. Kuala Lumpur : Dinamika Kreatif Sdn. Bhd.

UWB 20402 CREATIVITY AND 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.

REFERENCE(S):

1. Bernacki, E. 2002. *Wow! That's a Great Idea!*. Singapore : Prentice Hall.
2. Ceserani, J. & Greatwood, P. 1995. *Innovation and Creativity*. London: Kogan Page.
3. Ceserani, J. & Greatwood, P. 2001. *Innovation and Creativity*. New Delhi : Creast Publishing House.
4. Clegg, B. & Birch, P. 2002. *Crash Course in Creativity*. London : Kogan Page.
5. De Bono, E. 1998. *Edward De Bono Supermind Pack: Expand Your Thinking Power with Strategic & Mental Exercise*. DK Publishing Incorporated.

UQ* 1*1 CO-CURRICULUM II**

SYNOPSIS :

Matapelajaran ini ditawarkan dalam bentuk pelbagai aktiviti pilihan untuk pelajar peringkat Sarjana Muda dan Diploma. Tiga bidang aktiviti yang ditawarkan adalah Sukan & Rekreasi, Kelab/Persatuan dan Persatuan Beruniform.

**YEAR 1
SEMESTER II**

BDA 10302 MATERIAL SCIENCE

SYNOPSIS :

Introduction, Materials Structure, Mechanical Behaviour of Metal, Imperfection in Solid and Diffusion, Equilibrium and Transformation Phase, Metal, Ceramic, Polymer and Composite.

REFERENCE(S) :

1. Callister, W.D. Jr, 2007, "Materials Science and Engineering : An Introduction", 7th Edition, John Wiley
2. Smith, W.F., 2004, "Principles Of Materials Science And Engineering", 3rd Edition, McGrawHill
3. Shackelford, J.F., 2005, "Introduction To Materials Science For Engineers", 5th Edition, Prentice Hall.
4. Smith, W.F., 1996, "Principles Of Materials Science And Engineering", 3rd Edition, McGrawHill.

BDA 10402 SOLID MECHANICS 1

PRE-REQUISITE: STATICS

SYNOPSIS:

Stress and Strain, Shear Stress and Bending Moment, Bending Stress, Torsion, Thin Cylinder, Complex Stress.

REFERENCE(S):

1. Hibbeler, R.C. (2008). "Mechanics of Materials." SI 7th Edition. Pearson Prentice Hall
2. Beer, F.P., Johnston, E.R., and Dewolf, J.T. (2009). "Mechanics Of Materials." 4th Ed. In SI Units. McGraw-Hill.
3. Gere, J.M., Timoshenko, S.P., and Goodno, B.J. (2009). "Mechanics of Materials." 7th Edition. New York: Wadsworth/Cengage Learning.
4. Riley, W.F., Sturges, L.D., and Morris, D.H. (2007). "Mechanics of Materials." John Wiley & Sons Inc.
5. R.K. Rajput, (2007). "Strength of Materials: (Mechanics of solids) in SI Units", 4th Edition, New Delhi: S.Chand & Co.

BDA 10502 FLUID MECHANICS I

PRE-REQUISITE: STATICS

SYNOPSIS:

This course starts with an introduction to the fluid mechanics and fluid properties. Later it moves into Fluid Statics and Fluid Kinematics. Fluid Statics covers a principle of fluid statics, hydrostatic pressure and buoyancy. Fluid Kinematics includes the principles of continuity equation, Bernoulli and momentum equation and its applications. Finally it discusses an analysis of flow in pipes, similarity and dimensional analysis.

REFERENCE(S):

1. Cengel, Y.A., and Cimbala, J.M. (2006), *Fluid Mechanics Fundamentals and Applications*, McGraw Hill.
2. Munson, B.R., Young, D.F. and Okiishi, T.H., (2002), *Fundamentals of Fluid Mechanics*, 4th Edition, John Wiley & Sons.
3. Bukhari Bin Manshoor, Ahmad Fuad Bin Idris, Siti Mariam Bte Basharie, Md. Norizam Bin Mohamad Jaat. (2006), *Modul Pengajaran Mekanik Bendalir I*, FKMP, KUiTTTHO.
4. Douglas, J.F., Gasiorek, J.M. and Swaffield, J.A. (1998), *Fluid Mechanics*, Longman, 3rd Edition.

BDA 17001 ENGINEERING LABORATORY I

SYNOPSIS:

This course performs several experiments for Statics and Electrical Technology.

Statics: Balance of Forces, Polygon of Forces, Equilibrium of Rigid Body, Principle of Moment and Friction on a Plane.

Electrical Technology: Component Quantity and Unit, Measurement of Direct Current, Ohm's and Kirchhoff's Law, Superposition Theorem, Theorem of Thevenin and Theorem of Norton.

REFERENCE(S) :

1. Meriam, J.L. and Kraige, L. G., 2008, "Engineering Mechanics: Statics", 6th S.I. Edition, John Wiley & Sons, Inc.
2. Bedford, A. and Fowler, W., 2008. "Engineering Mechanics- Statics", 5th Edition, Pearson Prentice Hall.

3. Boylestad, R., 2007, "Introductory Circuit Analysis", 11th Edition, Prentice-Hall International.
4. Boylestad, R. and Nashelsky L., 2006, "Electronic Devices and Circuits Theory", 9th Edition, Prentice-Hall International.

BDA 18101 MECHANICAL ENGINEERING PRACTICE II

PRE-REQUISITE: MECHANICAL ENGINEERING PRACTICE I

SYNOPSIS :

Workshop Safety and Health, Sand Casting, Plaster Mould, Lost Foam Casting, Pneumatic Control, Electro-pneumatic Control and Hydraulic.

REFERENCE(S) :

1. S. Kalpakjian and Ed Addition, 1987, *Manufacturing Processes For Engineering Material*, 2nd Ed, John Wiley and Sons
2. P. L. Jain, 1989, *Foundry Patterns: Design and Manufacture*, National Institute of Foundry and Forge Technology, McGraw-Hill
3. Peter Beeley, 2001, *Foundry Technology*, 2nd Ed., Laser Words Madras, India
4. Michael J. Riches, (Penterjemahan: Wan Mohd. Norsani Wan Nik), 1995, *Hydraulic Power*

BEX 17003 TEKNOLOGI ELEKTRIK DAN ELEKTRONIK

SYNOPSIS :

Definasi asas: arus, voltan, kuasa, tenaga, arah rujukan dan kutub-kutub, Unsur-unsur litar unggul. Hukum-hukum litar. Hukum voltan Kirchhoff dan hukum arus Kirchhoff. Kaedah menganalisis litar a.t.: analisis arus cabang, analisis arus jejaring, analisis voltan nod. Teorem-teorem litar: teorem tindihan, Millman, Thevenin dan Norton. Unsur-unsur penyimpanan tenaga: pemuat dan pengaruh. Analisis litar-litar satu fasa. Pengubah elektrik.

REFERENCE(S) :

1. Flyod, *Principles of electric Circuits*, Coventional Current Version, Seventh Edition, Prentice Hall, 2003
2. John Bird, *Electrical and Electronic Principles and Technology*, Newness, 2000

- Alexander, C.K., Sadiku M.N.O., *Fundamentals of Electric Circuits*, McGraw Hill, 2003
- Basic Engineering Circuit Analysis*, 7th Ed.; J. David Irwin; John Wiley & sons; 2002

BWM 10203 ENGINEERING MATHEMATICS II

SYNOPSIS

First Order Differential Equations: Formation and methods of solution (separating the variables, homogeneous, linear and exact), initial value problem, applications (Newton Cooling Law, motion along the linear line and simple electric circuit). **Second Order Linear Differential Equation with Constant Coefficients:** Methods of solving: method of undetermined coefficient and method of variation of parameter, applications in mechanical motions includes free oscillations and force oscillations. **Laplace Transform:** Definition, linearity, first shift theorem, multiplying by t . Unit step functions and Delta functions, second shift theorem. Inverse Laplace transform: Definition and 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 period 2π , odd and even functions. Fourier series in interval $(-l, l)$. Half range Fourier series. **Partial Differential Equations:** Wave equations, heat equations.

REFERENCE(S) :

- Abd. Wahid Md. Raji, Mohd Nor Mohamad (2008) *Differential Equations for Engineering Students*.
- Stroud, K. A., Booth, D.J. (2007) *Engineering Mathematics*. 6th Ed. US: Palgrave Macmillan
- Stroud, K. A., Booth, D.J. (2007) *Further Engineering Mathematics*. 4th Ed. US: Palgrave Macmillan
- Kuldeep Singh (2003) *Engineering Mathematics through Applications*. Industrial Press, Inc.
- Robert J. Lopez (2001) *Advanced Engineering Mathematics*. Addison Wesley.
- Peter V. O'Neil (2003) *Advanced Engineering Mathematics*. Thomson Brooks/ Cole.

UWA 10302 ISLAM CIVILISATION AND ASIAN CIVILISATION

SYNOPSIS

The course discusses the introduction of civilization, its development, the interaction between civilizations; the Islamic civilization, Islam in the Malay civilization; Indian and Chinese civilizations as well as contemporary civilization issues and also the principles of Islam Hadhari.

REFERENCE(S) :

1. Ahmad Hakimi Khairuddin dan Faridah Che Husain. (2006). *Isu-isu Kontemporari Dalam Tamadun Islam dan Tamadun Melayu, dalam Tamadun Islam dan Tamadun Melayu. Siri Teks Pengajian Tinggi*. Kuala Lumpur: Penerbit Universiti Malaya2.
2. Ibnu Khaldun, Muqaddimah Ibnu Khaldun.
3. Huntington, S. *The Clash of Civilizations and the Remaking of the World Order*.Mahyuddin
4. Hj. Yahaya. (1998) *Tamadun Islam*, Shah Alam: Penerbit Fajar Bakti Sdn. Bhd.
5. Bei Ye. (2001). *Zhongguo Wenming Lun – Zhongguo Gudai Wenming De Benzhi Yu Yuanli* (Bicara Tamadun Cina – Teori dan Asas Tamadun Kuno Cina), Penerbit: Zhongguo Shehui Kexue Chubanshe Beijing.

UWB 10202 EFFECTIVE COMMUNICATION

SYNOPSIS

This course emphasizes on task- based learning approach and focuses on developing students' delivery of speech in oral interactions and presentations. Importance is given on mastery of self-directed learning, team-work, research, oral presentations, reasoning and creativity. This course also enables students to acquire knowledge and skills necessary for conducting and participating in meetings, including writing of meeting documents. Students will also be exposed to the techniques of conducting interview.

REFERENCE(S) :

1. Cheesebro,T, O'Connor, L. & Rios, F. (2007). *Communication Skills : Preparing for Career Success* (3rd ed.) Upper Saddle River, NJ: Pearson.
2. Davies, W.J. (2001) *Communication Skills : A Guide for Engineering and Applied Science Student* (2nd ed.) . London: Prentice Hall.
3. Joan van Emden, L. (2004). *Presentation Skills for Students*. New York: Palgrave Macmillan.
4. Richard Johnson-Sheehan. (2005). *Technical Communication Today*. New York: Pearson.
5. Salbiah Seliman et. al. (2004). *English Communication for Learners in ngineering*. Malaysia: Prentice Hall.

YEAR 2

**YEAR 2
SEMESTER I**

BDA 20103 DYNAMICS

PRE-REQUISITE: STATICS

SYNOPSIS:

This subject is an introduction of engineering dynamics to bachelor of mechanical engineering students. The topics covered are mainly focusing in two dimensional or planar coordinate system of kinematics and kinetics of particles as well as the kinematics and kinetics of rigid bodies. Various mechanical engineering applications are discussed in the form of example problems.

REFERENCE(S):

1. Hibbeler R.C., 2007. *“Engineering Mechanics - Dynamics”*, 11th S.I. Edition, Prentice Hall
2. Meriam J.L. and Kraige L. G., 2008. *“Engineering Mechanics - Dynamics”*, 6th Edition, John Wiley.
3. Bear F.P and Johnson E.R.,2007. *“Vector Mechanics for Engineers - Dynamics”*, 8th S.I. Metric Edition, Mc Graw Hill
4. Siswanto, W.A, 2008. *“Principles of Engineering Dynamics – Concise Theory and Applications”*, 1st Edition, Penerbit UTHM.

BDA 2022 THERMODYNAMICS I

**PRE-REQUISITE: ENGINEERING MATHEMATICS I (BWM 10103)
AND ENGINEERING MATHEMATICS II (BWM
10203)**

SYNOPSIS:

Definition and basic concepts, Properties of compressible pure substances, Heat and Work, The First Law of Thermodynamics, The Second Law of Thermodynamics, Thermodynamics Cycles, Reversibility of Entropy.

REFERENCE(S):

1. J. R. Howel and R. O. Buckins; *Fundamentals of Engineering Thermodynamics*, New York: McGraw Hill 1987.

2. D. B. Spalding and E. H. Cole; *Engineering Thermodynamics, 3rd Edition* Edward Arnold 1973.
3. G. F.C. Rogers and Y. R. Mayhew; *Engineering Thermodynamics: Work and Heat Transfer, 3rd Edition* Longman 1980.
4. Yunus A. Cengel and Micheal A. Boles: *Thermodynamics: An Engineering Approach, 2nd Edition*, McGraw Hill, 1994.

BDA 27001

ENGINEERING LABORATORY II

SYNOPSIS:

Fluid Mechanics:

Jet impact, Reynolds Number, Bernoulli's Theorem, Flow in Pipe, Hydrostatic Pressure and Cavitations in Pipe

Materials Science:

Introduction to Materials Science and Engineering, types of materials, atomic structure and bonding, material characteristics such as density and porosity, sampling preparation, metallographic, heat treatment method such as quenching and normalizing, metal sample preparation and study on hardness and properties of clay.

REFERENCE(S):

1. Mott R.L., 2000, "*Applied Fluid Mechanics*", 5th Edition, International Edition, Prentice Hall.
2. Munson B. R. et. al., 1998, "*Fundamental of Fluid Mechanics*", 3rd Edition, John Wiley & Sons.
3. Rajput R.K., 1998, "*Fluid Mechanics and Hydraulic Machines*", 1st Edition, S. Chand & Company Ltd.
4. Shackelford, J.S., 1999, "*Introduction to Materials Science For Engineers*", 5th Edition, Prentice Hall.

BWM 20403 ENGINEERING MATHEMATICS III

SYNOPSIS

Functions of Several Variables: Domains, ranges, contour line, level curves and 3D-graphs. Partial derivatives and chain rules. Mixed derivatives. Total differentials and exact differentials. Local and absolute extreme values of functions of two variables. **Multiple Integrations:** Double integrals: Areas and volumes. Double integrals

in polar coordinates. Surface areas. Triple integrals: Volumes. Triple integrals in cylindrical and spherical coordinates. Center of mass, center of gravity and inertial moments. **Vector-valued Functions:** Definition and graphs. Differentiations and integrations. Tangent vectors, normal vectors, arc length and curvature. Motion in a plane curve. Directional derivatives and gradients of functions of two variables. **Vector Calculus:** Line integrals of scalar and vector field. Independence of path and conservative vector field. Green's Theorem. Surface integrals of scalar and vector field. Gauss's Theorem and Stokes' Theorem

REFERENCE(S) :

1. Anton, H., Bivens, I., Davis, S. (2005) *Calculus*. 8th Ed. USA: John Wiley & Sons, Inc.
2. Stroud, K. A., Booth, D.J. (2007) *Advanced Engineering Mathematics*. 4th Ed. US: Palgrave Macmillan
3. Bradley, G.L. , Smith, K.J (1999) *Calculus*. 2nd Ed. New Jersey: Prentice Hall.
4. Abd. Wahid Md. Raji, Phang, C., Phang, P. (2007) *Engineering Mathematics III BSM2913*. (Learning Module). UTHM Publication.
5. Yusof Yaacob, Maslan Osman (2000) *Matematik Kejuruteraan*. UTM.
6. Thomas , Finey (1996) *Calculus*. 9th Ed. New York: Addison Wesley.
7. Smith, R.T. , Minton, R.B. (2006) *Calculus: Concepts & Connections*. New York: McGraw-Hill.
8. Stewart, J. (2003) *Calculus*. USA. Thomson Learning Inc.

UWA 10102 ISLAMIC STUDIES

SYNOPSIS :

This course explains about Islamic concept as ad deen. It discusses the study of al-Quran and al-Hadith, Aqidah ahl al-Sunnah wa al Jamaah, trends of aqidah's doctrine, the growth of fiqh's mazhab, the principles of muamalah, Islamic criminal law, the ethics of work in Islam, issues in Islamic Family law, and current issues

REFERENCE(S):

1. Harun Din, (Dr.), (2001), *Manusia Dan Islam*, Kuala Lumpur: Dewan Bahasa dan Pustaka
2. Ismail Hj. Ali, (1995), *Pengertian dan Pegangan Iktikad yang*

benar: Ahli Sunnah Wal Jamaah: Kuala Lumpur: Penerbitan al-Hidayah

3. Mustafa Abd. Rahman, (1998), *Hadith Empat Puluh*, Kuala Lumpur: Dewan Pustaka Fajar
4. Mustafa Hj. Daud, (1995), *Konsep Ibadah Menurut Islam*, Kuala Lumpur: Dewan Pustaka dan Bahasa.
5. Paizah Hj. Ismail, (1991), *Undang-undang Jenayah Islam*, Kuala Lumpur: Dewan Pustaka Islam, Angkatan Belia Islam Malaysia.

UWA 10202 MORAL STUDIES

SYNOPSIS :

This course explores the introduction to moral concepts, some aspects related to the morality and its importance in our daily lives, some western moral theories, moral values in great religions of the world, morality and ethics in professional careers and contemporary moral issues.

REFERENCE(S):

1. Eow Boon Hin. 2002. *Moral Education*. Longman
2. Ahmad Khamis. 1999. *Etika Untuk Institusi Pengajian Tinggi*. Kuala Lumpur. Kumpulan Budiman
3. Mohd Nasir Omar. 1986. *Falsafah Etika; Perbandingan Islam dan Barat*. Kuala Lumpur. JPM.
4. Hussain Othman. 2009. *Wacana Asasi Agama dan Sains*, B. Pahat. Penerbit UTHM
5. Hussain Othman, S.M. Dawilah Al-Edrus, Berhannudin M. Salleh, Abdullah Sulaiman, 2009. *PBL Untuk Pembangunan Komuniti Lestari*, Batu Pahat, Penerbit UTHM.

UWB 10*02 FOREIGN LANGUAGE

- **UWB 10*02 MANDARIN**

SYNOPSIS :

This course is designed for students to learn the basic Mandarin 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 Mandarin language.

REFERENCE(S):

1. Liang An Xiang. 2002. EPH Publishing (M) Sdn. Bhd. K.L.
2. Shi Yun. 2002. EPH Publishing (M) Sdn. Bhd. K.L.
3. Claudia Ross & Jing-heng Sheng Ma. 2006. Routledge. London
4. Lim Choon Bee. 2005. Universiti Putra Malaysia Press. Serdang
5. Hui Jin Chang. 2002. United Publishing House(M) Sdn.Bhd. K.L
6. Claudia Ross. 2002 .Press of Ohio. USA.
7. Duan Duan Li & Yanping Xie. 2002. Press of Ohio. USA.

● **UMG 1312 GERMAN**

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.

REFERENCE(S):

1. Nur Zakiah binti Amir Hamzah, Guten Tag !, Pejabat Penerbit UTHM
2. Angela Wilkes. 2006. GERMAN FOR BEGINNERS, London: Usborne Publishing Ltd.
3. Hartmurt Aufderstrasse. 1998. Themen Neu 1, Lehrwerk fuer Deutsch als Fremdsprache
4. Albert H. Small. 1991. German â la Cartoon. German Grammar through Cartoons

● **UMJ 1312 JAPANESE**

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.

REFERENCE(S):

1. *Kodansya`s Furigana Japanese Dictionary (2005)*
2. Minna no Nihongo Listening (2006) Second Published :3A Corporation Tokyo
3. Minna no Nihongo Jap-English (2006) Second Published :3A Corporation Tokyo
4. Japanese Conversation for Beginners (2006) Bonjinsha,Tokyo Japan
5. Japanese Language Center for International Students,Tokyo University of foreign Studies

● **UMR 1312 ARABIC**

SYNOPSIS :

This course is designed for students to learn the basic Arabic 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 Arabic language.

REFERENCE(S):

1. Mohd Hisyam Abdul Rahim; Ahmad Sharifuddin Mustapha; Mohd Zain Mubarak. 2008. *Bahasa Arab UMR 1312*. Batu Pahat: Penerbit UTHM.
2. Mohd Hisyam bin Abdul Rahim. 2005. *Senang Berbahasa Arab*. Batu Pahat: Penerbit KUiTTTHO.
3. Ab. Halim Mohammed; Rabiyyah Hajimaming; Wan Muhammad Wan Sulong. 2007. *Bahasa Arab Permulaan*. Serdang: Penerbit UPM.
4. Mohd Khairudin Khudri. 2006. *Akar Umbi Pembelajaran Bahasa Arab*. Kajang: One Touch Creative.
5. Sini, Mahmud Ismail; Abd Aziz, Nasif Mustapha; Husayn, Mukhtar. T.th. *al-'Arabiyyah Lil Nashiin, Kitab al-Tilmiz*. al-Mamlakah al-Saudiyah: Idarah al-Kutub al-Madrasiyyah, Wizarah al-Taalim

● **UMP 1312 SPANISH**

SYNOPSIS :

This course is designed for students to learn the basic Spanish 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 Spanish language.

REFERENCE(S):

1. Nurul Sabrina Zan: Hola! Hablo Español First Edition Batu Pahat: Penerbit UTHM.
2. Joy Renjilian - Burgay, Ana Beatriz Chiquito y Susan M. Mraz: Caminos.
3. Salina Husain : Vamos a aprender español lengua extranjera
4. Gail Stein : The Complete IDIOT'S GUIDE to Learning Spanish on Your Own Second Edition.
5. Irwin Stern : Ultimate SPANISH revised and update.

• **UMF 1312 FRENCH**

SYNOPSIS :

This course is designed for students to learn the basic French 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 French language.

REFERENCE(S):

1. Girardet, Jacky et Cridlig, Jean-Marie, 1996. *Méthod de français: PANORAMA 1*. Paris: CLE International.
2. Hatier, 1995. *Le Nouveau Bescherelle Complete Guide 12 000 French Verbs*. Paris: LIBRAIRIE HATIER.
3. Kaneman-Pougatch, Massia et al, (1997). *Méthod de français: Café Crème 1*. Paris: HACHETTE F.L.E
4. Grégoir, Maïa et al, (1995). *Grammaire Progressive du Français avec 500 exercices*. Paris: CLE International
5. Miquel, Claire Leroy et al, (1995). *Vocabulaire Progressive du Français avec 250 exercices*. Paris: CLE International

BTI 10202 COMPUTER PROGRAMMING

SYNOPSIS :

This course introduces the concept of programming by using high level language such as C. Students will learn the techniques to define and solve problems before writing the coding.

REFERENCE(S) :

1. Byron S. Gottfried, *“Programming with C”*, Mc Graw Hill, 1990
2. Baharudin Mohamed. ETL, *“A Book on C”*, Mc Graw Hill, 2002
3. Marini Abu Bakar et al, *“Pengaturcaraan C”*, Prentice Hall, 1999
4. Nor Haizan Mohamed Radzi, *“Pengaturcaraan C”*, UTM, 1998

UWA 10102 : ISLAMIC STUDIES

SYNOPSIS

This course explains about Islamic concept as ad deen. It discusses the study of al-Quran and al-Hadith, Aqidah ahl al-Sunnah wa al Jamaah, trends of aqidah's doctrine, the growth of fiqh's mazhab, the principles of muamalah, Islamic criminal law, the ethics of work in Islam, issues in Islamic Family law, and current issues

REFERENCE(S) :

1. Harun Din. (2001). *Manusia Dan Islam*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
2. Ismail Hj. Ali. (1995). *Pengertian dan Pegangan Iktikad yang benar: Ahli Sunnah Wal Jamaah*. Kuala Lumpur: Penerbitan al-Hidayah
3. Mustafa Abd. Rahman. (1998), *Hadith Empat Puluh*. Kuala Lumpur: Dewan Pustaka Fajar.
4. Mustafa Hj. Daud. (1995). *Konsep Ibadah Menurut Islam*. Kuala Lumpur: Dewan Pustaka dan Bahasa.
5. Paizah Hj. Ismail. (1991). *Undang-undang Jenayah Islam*. Kuala Lumpur: Dewan Pustaka Islam, Angkatan Belia Islam Malaysia.

UWA 10202 : MORAL STUDIES

SYNOPSIS

This course explores the introduction to moral concepts, some aspects related to the morality and its importance in our daily lives, some western moral theories, moral values in great religions of the world, morality and ethics in professional careers and contemporary moral issues.

REFERENCE(S) :

1. Eow Boon Hin. (2002). *Moral Education*. Longman.
2. Ahmad Khamis. (1999). *Etika Untuk Institusi Pengajian Tinggi*. Kuala Lumpur: Kumpulan Budiman.
3. Mohd Nasir Omar. (1986). *Falsafah Etika; Perbandingan Islam dan Barat*. Kuala Lumpur: JPM.
4. Hussain Othman. (2009). *Wacana Asasi Agama dan Sains*. Batu. Pahat: Penerbit UTHM..
5. Hussain Othman, S.M. Dawilah Al-Edrus, Berhannudin M. Salleh, Abdullah Sulaiman, (2009). *PBL Untuk Pembangunan Komuniti Lestari*. Batu Pahat: Penerbit UTHM.

UWB 20302 : TECHNICAL WRITING

SYNOPSIS

This course introduces students to report writing skills needed at tertiary level. Students will learn basic report writing skills such as proposals, progress report, informational and analytical reports. In order to do this, they will learn how to collect data using questionnaires. The data collected will be analyzed, transferred into graphic forms and presented orally and in writing. Based on the analysis of data, students will be able to draw conclusions and make recommendations.

REFERENCE(S) :

1. Finkelstein, J. (2008). *Pocket Book of Technical Writing*. 3rd ed. Singapore: McGraw Hill.
2. Kolin, P. C. (2006). *Successful Writing at Work*. Concise ed. USA: Houghton Mufflin Company.
3. Salbiah Seliman et. al. (2004). *English Communication for Learners in Engineering*. Malaysia: Prentice Hall.
4. Lakshmy Anantha Krishnan et. al. (2003). *Engineering YourRreport: From Start to Finish*. Singapore: Prentice Hall.
5. Gerson, S. J. & Gerson, S. M. (2003). *Technical Writing: Process and Product*. 3rd ed. New Jersey: Prentice Hall.

**YEAR 2
SEMESTER II**

BDA 20303 MECHANICS OF MACHINES

PRE-REQUISITE : DYNAMICS

SYNOPSIS :

This subject covers several topics including gear systems, balancing, power transmission, belting, friction in screws and nut, mechanism and introduction to vibration. These essential topics in machining might provide students with proficient theoretical and graphical background in dealing with machine systems. Student will learnt to apply the principle and theory of mechanics of machine to solve system's problem such as gear system, balancing and belting system in the real engineering practice

REFERENCE(S) :

1. Roslan, Che' Abas, Mohd Yunus,"Mekanik Mesin", 2001, Edisi Ketiga, Unit Penerbitan UTM.
2. B.K. Sarkar, "Theory of Machines", 2002, Tata Mc-Graw Hill
3. J.S. Hannah and R.C. Stephens, "Mechanics of Machines",1972, Unwin Brothers Ltd.
4. John J.U, Gordon R.P, Joseph E.S," Theory of Machines and Mechanism", 2003, Oxford University NY.

BDA 20402 ENGINEERING MATERIALS SELECTION

PRE-REQUISITE: MATERIALS SCIENCE

SYNOPSIS:

Introduction to Material Selection, Design Process, Engineering Materials and Properties, Materials Selection Charts, Selection of Selection of Non-Metal.

REFERENCE(S):

1. Ashby M.F., 2000, "Materials Selection in Engineering Design", 2th Edition, Butterworth-Heinemann
2. Mangonon P.L., 1999, "The Principles Of Materials Science for Engineering Design", Prentice Hall

3. Budinski K. & Budinski, G., 1999, "Engineering Materials Properties and Selection", Prentice Hall
4. Schaffer J.P. et al, 1999, "The Science and Design of Engineering Materials", 2nd Edition, McGraw-Hill

BDA 20502 COMPUTER AIDED DESIGN

PRE-REQUISITE :ENGINEERING DRAWING

SYNOPSIS:

Creating, editing and plotting of 2D Autocad drawings, Adding text and dimensions to drawings, Produce orthographic drawing, Introduction to three dimensional drawing, Specifying user-defined coordinate systems, Development of 3D drawings and models from engineering sketches and orthographic drawings, Creating assembly and explode drawing for project drawing.

REFERENCE(S):

1. Khairul Anuar Hanafiah (2006), *Lukisan Kejuruteraan Berbantu Komputer – Edisi Kedua*, Universiti Teknologi Malaysia, Johor, Malaysia.
2. Jamaluddin Mohd Taib, Khairul Anuar Hanafiah dan Mohd Fadzli Daud (2006), *Rekabentuk Berbantu Komputer – Asas Pemodelan*, Universiti Teknologi Malaysia, Johor, Malaysia.
3. Mohd Fadzli Daud and Khairul Anuar Habafiah (2000), *Panduan Asas Lukisan Kejuruteraan*, Universiti Teknologi Malaysia, Johor, Malaysia.
4. AutoCAD 2006, user guide.
5. John Wilson and Alan J. Kalameja (2003), *Autocad 2002: 3D Modelling, A Visual Approach*, Autodesk.
6. James M. Kirkpatric (2003), *The Autocad Book: Drawing, Modeling and Application Using Autocad 2002*, Pearson, Upper Saddle River, New Jersey.

BDA 27101

ENGINEERING LABORATORY III

SYNOPSIS:

This course performs several experiments for Solid Mechanics and Dynamics.

Solid Mechanics I: Tensile, Torsion, shearing force, tegasan lenturan rasuk and Thin Cylinder.

Dynamics : Simple Pendulum , Projectile , Energy Conservation , Mechanism of Crank and Universal Coupling.

REFERENCE(S) :

1. Gere, J.M. and Goodno, B.J., 2009. "Mechanics of Materials", 7th Edition, Cengage Learning.
2. Beer, F.P., Johnston, E. R. and Deworlf, J.T., 2009. "Mechanics of Materials", 5th Edition, Mc Graw Hill.
3. Bedford, A. and Fowler, W., 2008. "Engineering Mechanics-Dynamics", 5th Edition, Pearson Prentice Hall.
4. Soutas-Little, R.W., Inman, D. J. and Balint, D.S., 2008. "Engineering Mechanics : Dynamics", Thomson Learning

BDA 27201

ENGINEERING LABORATORY IV

SYNOPSIS:

Thermodynamics I:

1st Law of Thermodynamics, Separating and Throttling Calorimeter, Temperature and Pressure Measurement, Marcet Boiler, and Boyle's Law.

Mechanics of Machine:

Undamped Beam Oscillation, Balancing of Rotating Mass, Computerized Gear Systems, Bevel Gear, and Belt Friction.

REFERENCE(S):

1. Mohd Kamal Ariffin, Farid Nasir Ani, Zulkarnain Abdul Latif, 2002 "Termodinamik Asas", Penerbit UTM.
2. Yunus A, Cengel, Michael A. B, 2002 "Thermodynamics : An Engineering Approach", Boston, Mc Graw Hill.
3. Roslan Che Abas, Mohd Yunus, 2001, "Mekanik Mesin". Edisi Ketiga, Unit Penerbitan UTM.

4. John J.U., Gordon R. P., Joseph E. S., 2003, *Theory of Machines and Mechanism*". Oxford University, New York.

**BDA 28001 MECHANICAL ENGINEERING PRACTICE III
(OPTION 1)**

PRE-REQUISITE: MECHANICAL ENGINEERING PRACTICE II

SYNOPSIS:

This course discusses the basics of air conditioning system, air conditioning system operation, maintenance of air conditioning components, piping system, coolant maintenance and air conditioning system installation.

REFERENCE(S):

1. William C. Whitman, William M. Johnson & John A. Tomczyk (2005), *Air Conditioning and Refrigeration for the Professional*, 5th Edition, Thomson.
2. Tom Birch (2003), *Automotive Heating and Air Conditioning*, Second edition, Prentice Hall
3. Robert Chatenever (1989), *Air conditioning and refrigeration for the professional*, Prentice Hall.
4. Sugarman, Samuel C. (2005), *HVAC fundamentals*, Boca Raton, FL: CRC Press.

**BDA 28001 MECHANICAL ENGINEERING PRACTICE III
(OPTION II)**

PRE-REQUISITE: MECHANICAL ENGINEERING PRACTICE II

SYNOPSIS:

Safety and regulations, concept of metal cutting, CNC codes and programming, method in writing/editing of CNC program, machining parameters, machining operation.

REFERENCE(S):

1. Robert Quesada, 2005, *Computer Numerical Control: Machining & Turning Centers*, Prentice Hall.
2. Peter Smid, 2000, *CNC Programming Handbook*, 1st. Ed, Industrial Press.

3. John A. Schey, 2000, Introduction to Manufacturing Process, 1st Ed, McGraw-Hill International.
4. Hass Automation (2004), Hass Programming Workbook, Hass Automation Inc

**BDA 28001 MECHANICAL ENGINEERING PRACTICE III
(OPTION III)**

PRE-REQUISITE: MECHANICAL ENGINEERING PRACTICE II

SYNOPSIS:

Fibers, Yarn Manufacturing, Woven and Knitted Fabric, Testing on Yarn and Fabric, Principle of Packaging Engineering, Testing on Packaging Materials, Packaging Dynamic and Packaging Equipments.

REFERENCE(S):

1. D.J Spencer (2001), Knitting Technology, Woodhead Publication.
2. B.J Collier (1999), Textile Testing and Analysis, Merrill, New Jersey.
3. Alfred, H.M. (1998), Transport Packaging, Institute of Packaging Professionals. Herndon, Virginia.
4. Davis, C. G. (1990), Introduction to Packaging Machinery, Packaging Machinery Manufacturers Institute, USA.

**BDA 28001 MECHANICAL ENGINEERING PRACTICE III
(OPTION 4)**

SYNOPSIS:

Laboratory Safety and Regulations, Composites Production Based On Fiber Glass, Samples Preparations and Plastics Product, Production of Membrane, Production of Nylon 6,6, Electrode Deposition, Samples Preparation of Non-Ferrous Metals for Metallography Study.

REFERENCE(S):

1. Callister, W.D.(2007), Materials Science and Engineering : An Introduction, 7th ed, John Wiley.
2. Shackelford, J.F. (2005), Introduction to Materials Science For Engineers, 5th ed, Prentice Hall.

- Schaffer, J.P., Saxena, A., Antolovich, S.D., Sanders Jr., T.H. & Warner, S.B. (1999), *The Science and Design of Engineering Materials*, 2nd ed, McGraw-Hill.
- Ashby, M.F. & Jones, R. (1993), *Engineering Materials*, Pergamon Press.

BWM 20502 : ENGINEERING STATISTICS

SYNOPSIS

Random Variables. Probability Distributions: Binomial, Hypergeometric, Poisson and Normal distributions. Normal approximation to Binomial and Poisson. **Sampling Distribution:** Sampling distribution for mean and difference between two means, distribution for proportion. **Estimation:** Point estimation and confidence intervals, confidence intervals for mean, variance and proportion. **Hypothesis Testing:** Mean for small/large sample, difference between two means and proportion for small/large sample. Variance and the ratio of variance. **Simple Linear Regression:** Graphical method, least square method. Coefficient of determination R^2 . Correlation.

REFERENCE(S) :

- Cik Sri Mazzura, Nafisah, Kek, S.L. & Phang, P. (2007) *Engineering Statistics (Module)*
- Ronald E.Walpole & Raymond H Myers (1998) *Probability and Statistics for Engineers and Scientists*, 6th ed. Prentice Hall.
- William Mendenhall & Terry Sincich (1995) *Statistics for Engineering and the Science*, 4th ed. Prentice Hall.
- Allan G.Bluman (2001) *Elementary Statistics: A Step by Step Approach*. McGraw-Hill.
- George Woodbury (2004) *An Introduction to Statistics*. Thomson Learning.
- Douglas C. Montgomery, George C. Runger and Norma Faris Hubele. (2004) [Engineering Statistics](#). John Wiley, [New York](#).

UWS 10202 : ETHNIC RELATIONS

SYNOPSIS

This course focuses on the concept of ethnic relations and its practices in the Malaysian society. Class discussions cover the fundamental of ethnic relations and the history of the construction of a plural society. The Malaysia Constitution will be covered as a core of living in the society. Discussions will be further conducted into detail on the linkages between ethnicity and development in social, political and economic aspects based on top-down and bottom-up approaches by the government and society.

REFERENCE(S) :

1. Shamsul Amri Baharuddin (2007). *Modul Hubungan Etnik*. Shah Alam: Universiti Teknologi MARA.
2. Zaid Ahmad, Ho Hui Ling, Sarjit Sing Gill, Ahmad Tarmizi Talib, Ku Halim Ku Arifin, Lee Yok Fee, Nazri Muslim dan Ruslan Zainuddin (2006). *Hubungan Etnik di Malaysia*. Shah Alam: Oxford Fajar Sdn. Bhd.
3. Lembaga Penyelidikan Undang-undang (2003). *Perlembagaan Persekutuan: (hingga 15hb Ogos 2003)*. Petaling Jaya: International Law Book Services.
4. Nazaruddin Mohd Jali, Ma'rof Redzuan, Asnarulkhadi Abu Samah dan Ismail Mohd Rashid (2005). *Pengajian Malaysia*. Petaling Jaya: Prentice

UWB 11202 : MALAY LANGUAGE

SYNOPSIS

This course is designed for students to learn the basic of 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.

REFERENCE(S) :

1. Asmah Hj. Omar. (2005). *Susur Galur Bahasa Melayu*. KL: DBP..

2. Asmah Hj. Omar. (2003). *Nahu Melayu Mutakhir*. KL: DBP.
3. Abdul Hamid Mahmood. (1992). *Menguasai Ejaan Bahasa Malaysia Dengan Cepat*. KL: DBP
4. Abdul Hamid Mahmood. (1998). *Menguasai Ejaan Bahasa Melayu*. KL: DBP.
5. Edward S. King. (1998). *Speak In Malay*. KL: Times Publication..
6. Edward S. King. (1998). *Write In Malay*. Times Publication : KL

UQ* 1*1**

CO-CURRICULUM II

SYNOPSIS :

Matapelajaran ini ditawarkan dalam bentuk pelbagai aktiviti pilihan untuk pelajar peringkat Sarjana Muda dan Diploma. Tiga bidang aktiviti yang ditawarkan adalah Sukan & Rekreasi, Kelab/Persatuan dan Persatuan Beruniform.

YEAR 3

**YEAR 3
SEMESTER I**

BDA 30203 FLUID MECHANICS II

PRE-REQUISITE: FLUID MECHANICS I

SYNOPSIS:

This course continues from Fluid Mechanics I. The course covers viscous flow in pipes, differential equation for fluid flow with emphasis on flow potential, boundary layer theory, introduction to turbo machinery and introduction to compressible fluid flow.

REFERENCE(S):

1. Bruce R. Munson, Donald F. Young and Theodore H. Okiishi, 1998, "*Fundamental of Fluid Mechanics*", 3rd Edition, John Wiley & Sons.
2. J. F. Douglas, J. M. Gasieriek and J. A. Smallfield, "*Fluid Mechanics*", 3rd Edition: Longman Singapore Publishers (Pte) Ltd.
3. Merie C. Porter and David C. Wiggert, 1997, "*Mechanics of Fluid*", 2nd Edition, Prentice Hall.
4. Robert L. Mott, 2000, "*Applied Fluid Mechanics*", 5th Edition (International Edition), Prentice Hall.

BDA 30303 SOLID MECHANICS II

PRE-REQUISITE: MECHANICS OF MATERIAL 1

SYNOPSIS :

The subject mechanics of material II involves analytical methods for determining stress, strain and stability of various engineering components and structures. A thorough understanding of the basic principles is useful to mechanical engineers. The syllabus is organized in six chapters. Chapter 1 deals with plane-strain transformation system. Methods for determining the principal strains analytically and graphically have been considered in this chapter. Chapter 2 discusses the determination of slope and deflection for various type of beams both statically determinate and statically indeterminate beams. Buckling analysis of columns and struts using Euler's and Rankine's theory are studied in chapter 3. Chapter 4 provides a discussion and application of strain energy methods for

computing a problems related to deflection, torsion and axial load including the application of Castigliano's theorem. Chapter 5 explore stress analysis of thick cylindrical vessels subjected to internal and external pressures. Lastly, in chapter 6 deals with application of various theories of failure to predict the safety of componets and engineering structures.

REFERENCE(S) :

1. R.C Hibbeler, 2008. "*Mechanics of Materials*", 7th. Edition, Prentice Hall International.
2. B.K. Sarkar, 2003. "*Strength of Material*", McGraw Hill.
3. James M.Gere & Stephen P.Timoshenko, 1999. "*Mechanis of Material*", 3rd Edition, Stanley Thornes.
4. E.J. Hearn, 1997. "*Mechanics of Materials*", 3rd Edition, Pergamon Press.

BDA 30403 THERMODYNAMICS II

PRE-REQUISITE: THERMODYNAMICS I

SYNOPSIS :

The course will give emphasize to the application of thermodynamics laws in engineering applications. The students will be exposed to the working principle of power plants, machines and engines that operate based on thermodynamics system. The student will have the ability to describe indicated diagrams, analyze the thermodynamics cycles, and compare between the theories and actual applications. Thermodynamics systems that are going to be discussed includes steam and gas power plants, heat pump and refrigeration system, reciprocating compressor, internal combustion engines and non reactive mixtures, and cooling tower system.

REFERENCE(S) :

1. Chengel Y.A. & Boles M.A, (1994), "Thermodynamics: An Engineering Approach", McGraw Hill.
2. Eastop T.T & McConkey A., (1993), "Applied Thermodynamics For Engineering Technologist: Fifth Edition", Longman, Essex.
3. Rogers G.F.C., & Mayhew Y.R., (1993), "Engineering Thermodynamics", Black Well.
4. Van Wyle G.J., Sonntag R.E. & Borgnakke C., (1994), "Fundamentals of Classical Thermodynamics" John Wiley & Sons, Inc., Canada.

5. D.R.Spalding and E.H. Cole ; Engineering Thermodynamics ; Edward Arnold 3rd Edition ; 1978.
6. Md. Razali Ayub dan Mohammad Zainal Mohd Yusof, Termodinamik Gunaan untuk Ahli Teknologi Kejuruteraan; Penerbit UTM, Skudai, 1996.
7. J.R. Howel, R. O Buckins; Fundamental of Engineering Thermodynamics ; McGraw Hill.

BDA 37001 ENGINEERING LAB V

SYNOPSIS :

Fluid Mechanics II :

Pelton Wheel, Friction Losses in Pipes, Centrifugal Pump, Boundary Layer and Cavitation

Mechanics of Solids II

Bucklings of Struts, Deflections of Curved Bars and Davits, Deflections of Simply Supported Cantilever Beams and Thick Cylinder.

REFERENCE(S) :

1. Bruce R. M., et.al., 1998, "*Fundamental of Fluid Mechanics*", 3rd Edition, John Wiley & Sons
2. Robert L. M., 2000, "*Applied Fluid Mechnics*", 5th Edition, International Edition, Prentice Hall
3. Rajput R.K., 1998, "*Fluid Mechnics and Hydraulic Machines*", 1st Edition (SI units), S. Chand & Company Ltd
4. Beer F. and Johnston E. R, 1992, "*Mechanics of Materials*", 2nd Edition, Mc Graw Hill

BWM 30603 ENGINEERING MATHEMATICS IV

PRE-REQUISITE: BWM 10103 (ENGINEERING MATHEMATICS I)

SYNOPSIS :

Solution of Nonlinear Equations: Bisection, secant, and Newton Raphson method. **Solution of Linear Systems of Equations:** Gaussian elimination, LU decomposition, Thomas, and Gauss-Seidel method. **Interpolation and Polynomial Approximation:** Newton's divided-difference, Lagrange and Cubic Spline. **Numerical Differentiation:** Taylor series expansion. **Numerical Integration:**

Simpson and Gauss quadrature method. **Eigen Values:** Power method. **Ordinary Differentiation Equations:** Solution of Initial-Value Problems with Taylor Series, Euler, Huen, Runge-Kutta methods. Solution of Boundary-Value Problems with finite difference method. **Partial Differentiation Equations:** Explicit and implicit method using finite difference method. **Finite-element Method:** Introduction to Finite Element Method. General approach. Finite-element application in one dimension.

REFERENCE(S)

1. Nafisah Md Kamaruddin, Phang, C., Phang, P., Tay, K.G. (2007) *Numerical Method* (Learning Module). UTHM Publication.
2. Chapra, S.C. Canale R.P. (1989) *Numerical Methods for Engineers*. Mc Graw-Hill.
3. Jain, M.K. Iyengar, S.R.K. Jain, R.K. (1987) *Numerical Methods for Scientific and Engineering Computation*. 2nd Ed. Wiley Eastern Ltd.
4. Mathew, J.H. (1992) *Numerical Methods for Mathematics, Science & Engineering*. 2nd Ed. Prentice Hall.
5. Buchanan, J.L. & Turner, P.R. (1992) *Numerical Methods and Analysis*. McGraw Hill.
6. Burden, L.R. Faires, J.D. (1997) *Numerical Analysis*. 6th Ed. Brooks/Cole Publishing Company.

BPK 20802 ENTREPRENEURSHIP

This course exposes students on the various aspects of entrepreneurship. The course covers four main modules namely, inculcating entrepreneurship culture, opportunities and preparation of business plans, entrepreneurship practicum and presentation of reports on entrepreneurship activities.

REFERENCE(S)

1. Kementerian Pengajian Tinggi (2007) 'Asas Pembudayaan Keusahawanan'. Penerbit UUM;
2. Marc J. Dollinger. – 3rd ed. (2003), 'Entrepreneurship; Strategic and Resources'. Prentice Hall Pearson Malaysia Sdn. Bhd.
3. UiTM Entrepreneurship Study Group (2004), 'Fundamentals of Entrepreneurship' Prentice Hall Pearson Malaysia Sdn. Bhd.
4. Carol Yip (2007) 'Smart Money-User' Kanyin Publication.
5. Agensi Kaunseling and Pengurusan Kredit (2009) 'Money Sense-Getting Smart with Your Money. 2nd Edition

6. Agensi Kaunseling and Pengurusan Kredit (2009) 'Celik Wang-
Pengurusan Wang secara Bijak
7. Ministry of Domestic Trade & Consumer Affairs,
www.kpdnhep.gov.my
8. Personal Money (the Edge Magazine),
www.theedgemalaysia.com
9. Agensi Kaunseling and Pengurusan Kredit (AKPK),
www.akpk.org.my
- 10.

BPK 30902 ENGINEERING ECONOMICS

SYNOPSIS :

Ekonomi kejuruteraan merupakan satu bidang kajian yang mengaitkan beberapa aspek ekonomi semasa membuat keputusan kejuruteraan. Aspek tersebut melibatkan penilaian kos dan faedah bagi projek teknikal yang dicadangkan. Konsep asas yang digunakan ialah nilai wang-masa, dan teknik yang berkaitan dengan pengkompaunan, pendiskaunan, dan konsep kesetaraan. Beberapa kaedah digunakan untuk menentukan sama ada sesuatu pelaburan itu menguntungkan atau tidak iaitu kaedah PW, FW, AW, IRR dan kaedah faedah-kos.

REFERENCE(S):

1. Blank, L.T., A. Tarquin (2008): *Basics of Engineering Economy*, International ed., McGraw-Hill, New York,
2. Mohamad Sirin, R. (2007): *Teori Asas Ekonomi Kejuruteraan*, Cetakan Awal, Fakulti Pengurusan Teknologi, KUITTHO. Malaysia.
3. Sullivan W.G, Wicks E.M. & Luxhoj J.T, (2006). *Engineering Economy*, 13th Edition, Prentice Hall Inc.
4. Chan S. Park, (2007). *Contemporary Engineering Economics*, 4th Edition, Pearson International Edition.

YEAR 3 SEMESTER II

**BDA 28101 MECHANICAL ENGINEERING PRACTICE I
(Option 1)**

**PRE-REQUISITE: MECHANICAL ENGINEERING PRACTICE III
(OPTION 1)**

SYNOPSIS:

This course discusses engine maintenance, power systems, electrical systems, fuel ignition systems and car control systems.

REFERENCE(S):

1. Gilles, T. (2004), *Automotive Service, Inspection, Maintenance, Repair*, 2nd Ed, Thomson Delmar Learning.
2. Knowles, D. (2005), *TechOne: Basic Automotive Service and Maintenance*, Thomson Delmar Learning.
3. Glencoe (2004), *Automotive Excellence* Volume 1, Glencoe McGraw-Hill.

**BDA 28101 MECHANICAL ENGINEERING PRACTICES IV
(OPTION II)**

**PRE-REQUISITE : MECHANICAL ENGINEERING PRACTICES III
(OPTION II)**

SYNOPSIS :

Safety and regulations, electro-discharge machining operational principle (EDM wire cut and EDM die sink), ISO/EIA code, create /edit programme, machining parameter, machine handling, introduction of plastics injection, plastic injection simulator software, gating system and runner, materials selection, flow rate, pressure and temperature.

REFERENCE(S):

1. Richard R. Kibbe, John E. Neely, Roland O. Meyer, Warren T. White, *Machine Tool Practices*, 2006, 8th Ed., Prentice Hall
2. Steve F. Krar Albert F. Check, *Technology of Machine Tools*, 1998, 5th Ed, McGraw Hill

3. Bralla, James G, "*Handbook of Manufacturing : How Product, Components and Materials are Made*", 2007, Industrial Press, New York
4. Mikel P. Groover , "*Fundamentals of Modern Manufacturing : Materials, Processes and Systems*", 2007, John Wiley, New York
5. CADMOLD 3D-F, "*User Manual SIMCON*", 2007, Germany

**BDA 28101 MECHANICAL ENGINEERING PRACTICES IV
(OPTION III)**

**PRE-REQUISITE: MECHANICAL ENGINEERING PRACTICES III
(OPTION III)**

SYNOPSIS :

Programmable automated system, Circuit system and PLC installation, Basic technology of industrial robotic, robot operation and automated simulation.

REFERENCE(S):

1. S. Brian Morris (2000), Programmable Logic Control, Prentice-Hall Inc.
2. S. R. Majumdar (1995), Pneumatic Systems, Tata McGraw-Hill.
3. Lung-Wen Tsai (1999), Robot Analysis, John Wiley & Sons.
4. James A. Rehg, & Eric J. Black (2007), Programmable logic controllers, Prentice-Hall Inc.

**BDA 28101 ENGINEERING MECHANICAL PRACTICE IV
(OPTION 4)**

PRE-REQUISITE: ENGINEERING PRACTICE III (OPTION 4)

SYNOPSIS:

Laboratory Safety and Regulation, Preparation of POP Mould for Ceramic Casting Process, Production of Ceramic Product Through Casting, Production of Ceramic Sample Through Powder Processing, Production of Ceramic Product and Glazing, Screen Printing, Glass Formation.

REFERENCE(S):

1. Callister, W.D. Jr, 2007, "Materials Science and Engineering: An Introduction", 7th Edition, John Wiley.
2. Smith, W.F., 2004, "Principles of Materials Science and Engineering", 3rd Edition, McGrawHill.
3. Shackelford, J.F., 2005, "Introduction to Materials Science for Engineers", 5th Edition, Prentice Hall.
4. Schaffer, J.P., Saxena, A., Antolovich, S.D., Sanders Jr., T.H. & Warner, S.B. (1999), The Science and Design of Engineering Materials, 2nd Edition, McGraw-Hill.

BDA 30502

MANUFACTURING TECHNOLOGY

SYNOPSIS:

Introduction to Manufacturing Technology, Material Properties and Product Attributes, Metal Removal Processes, Solidification Processes, Metal Forming, Plastic Shaping Processes, Powder Metallurgy Process, Joining Processes.

REFERENCE(S) :

1. Mikell P. Groover, "*Fundamentals of Modern Manufacturing*", Third Edition, McGraw Hill, 2007.
2. Serope Kalpakjian and Steven R. Schmid, "*Manufacturing Engineering and Technology*", Fifth Edition, Prentice Hall, 2006.
3. John A. Schey, "*Introduction to Manufacturing Process*", Third Edition, McGraw Hill, 2000.
4. Richard R. Kibbe, John E. Neely, Roland O. Meyer, Warren T. White, "*Machine Tool Practices*"; Eighth Edition, Prentice Hall, 2006.

BDA 30603

HEAT TRANSFER

PRE-REQUISITE: FLUID MECHANICS II, THERMODYNAMICS II

SYNOPSIS:

Topics in this course include (but are not limited to) mathematical analysis of idealized cases for steady and unsteady conduction,

analytical and semi-empirical methods in convection, heat exchanger analysis and radiation exchange.

REFERENCE(S):

1. Cengel, Y. A, (2006), "Heat and Mass Transfer: A Practical Approach 3rd Edition. (SI Units)", McGraw Hill, New York.
2. Incropera, F. P. and DeWitt, D. P. (2002), "Introduction to Heat Transfer 5th Edition", John Wiley & Sons, Asia.
3. Cengel, Y. A. and Boles, M. A. (2006) "Thermodynamics: An Engineering Approach 5th Edition (SI Units)", McGraw Hill, New York.
4. White, F. M., (2008), "Fluid Mechanics 6th Edition", McGraw-Hill, New York

BDA 3073 CONTROL ENGINEERING

PRE-REQUISITE: ENGINEERING MATHEMATICS II

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.

REFERENCE(S):

1. Ogata K. (2002), *Modern Control Engineering*, 4th Edition, Prentice Hall, New Jersey Sons
2. J. Dorf, (2004), '*Modern Control Engineering*', Addison Wesley Publishing
3. Johnson, C.D, (2005), *Process Control Instrumentation Technology*, 8th Edition, Prentice Hall
4. Allan S Morris,(2001) *Measurement and Instrumentation Principles*, Butterworth Heinemann
5. Norman S. Nise, (2004) *Control System Engineering*, 4th Edition, The Benjamin Cummings Publishing Co. Inc
6. *Introduction to Matlab 7 for Engineers*, (2005) McGraw-Hill International Edition

BDA 30803 MECHANICAL ENGINEERING DESIGN

PRE-REQUISITE: STATICS, DYNAMICS, SOLID MECHANICS II AND MATERIAL SELECTION.

SYNOPSIS:

Introduction to engineering design process, its role in the technology development and its impacts, the engineering fundamentals and its applications, applications and design considerations of permanent and non permanent joining, springs, bearings, shafts, gears, screw and fastener.

REFERENCE(S):

1. Hamrock, B. J., Schmid, S. R., & Jacobson, B. (2005). *Fundamentals of Machine Elements, Second Edition*. Boston: McGraw Hill.
2. Juvinall, R. C., & Marshek, K. M. (2006). *Fundamentals of Machine Design, Fourth Edition*. Hoboken: John Wiley & Sons.
3. Norton, R. L. (2006). *Machine Design, an Integrated Approach*. Upper Saddle River: Pearson Prentice Hall.
4. Shigley, J. E., Mischke, C. R., & Budynas, R. G. (2004). *Mechanical Engineering Design, Seventh Edition*. New York: McGraw Hill.

BDA 37101

ENGINEERING LABORATORY VI

SYNOPSIS :

Fluid Mechanics II :

Pelton Wheel, Friction Losses in Pipes, Centrifugal Pump, Boundary Layer and Cavitation

Mechanics of Solids II

Bucklings of Struts, Deflections of Curved Bars and Davits, Deflections of Simply Supported Cantilever Beams and Thick Cylinder.

REFERENCE(S) :

1. Bruce R. M., et.al., 1998, "*Fundamental of Fluid Mechanics*", 3rd Edition, John Wiley & Sons
2. Robert L. M., 2000, "*Applied Fluid Mechcnics*", 5th Edition, International Edition, Prentice Hall
3. Rajput R.K., 1998, "*Fluid Mechcnics and Hydraulic Machines*", 1st Edition (SI units), S. Chand & Company Ltd
4. Beer F. and Johnston E. R, 1992, "*Mechanics of Materials*", 2nd Edition, Mc Graw Hill

**YEAR 3
SEMESTER III**

BDA 38004 INDUSTRIAL TRAINING

SYNOPSIS:

Students are required to undergo industrial training as trainee engineers in mechanical engineering for a period of 12 weeks. Students will be required to follow industrial training schedule provided by the company for example planning, management, designing, evaluating, decision making, specialization and supervision. Assessment will be conducted by supervisors appointed from the faculty and the industry.

REFERENCE(S):

1. Industrial Training Log Book

YEAR 4

**YEAR 4
SEMESTER I**

BDA 40102 INDUSTRIAL ENGINEERING

SYNOPSIS :

Introduction of industrial engineering, facilities planning, basic concepts of statistics, method study, work measurement, ergonomics, production planning and control, quality control.

REFERENCE(S) :

1. Stevenson, W.J., 2007, "Operations Management", 9th Edition, McGraw Hill.
2. Heizer, J. and Render, B., 2006, "Principles of Operations Management", 8th Edition, Prentice Hall.
3. Nahmias, S., 2005 "Production and Operations Analysis", 5th ed., McGraw-Hill.
4. Krajewski, L.J., 2002, "Operations Management: Strategy and Analysis", 6th Edition, Prentice Hall.

BDA 40203 ENGINEERING DESIGN

PRE-REQUISITE: MECHANICAL ENGINEERING DESIGN I, FLUID MECHANICS II, THERMODYNAMICS II

SYNOPSIS:

The subject discuss about common engineering design methods begin from identification of needs to the design embodiment. Ergonomic and economic considerations are included as well as engineering design tools such as finite element analysis and kinematic analysis software application. Case studies in different applications will be also discussed.

REFERENCE(S):

1. Cross, N. (2000). *Engineering Design Methods, Third Edition*. New York: McGraw-Hill.
2. Dieter, G. E., & Schmidt, L. C. (2009). *Engineering Design, Forth Edition*. New York: McGraw Hill.
3. Dym, C. L., & Little, P. (2003). *Engineering Design, a Project Based Introduction*. New York: John Wiley & Sons.

4. Farag, M. M. (2008). *Materials and Process Selection for Engineering Design*. Boca Raton: CRC.
5. Haik, Y. (2003). *Engineering Design Process*. Australia: Thomson Learning.
6. Pahl, G., & Beitz, W. (2007). *Engineering Design, a Systematic Approach*, Third Edition. London: Springer Verlag.
7. Pheasant, S., & Haslegrave, C. (2006). *Bodyspace : Anthropometry, Ergonomics, and the Design of Work, Third Edition*. Boca Raton: Taylor & Francis.
8. Ulrich, K. T., & Eppinger, S. D. (2004). *Product Design and Development, Third Edition*. Boston: McHraw Hill.

BDA 40303

FINITE ELEMENT METHOD

SYNOPSIS:

Fundamental concepts, solution methods, gaussian elimination, one-dimensional problems, trusses, two dimensional problems using constant strain triangles, axisymmetric solids subjected to axisymmetric loading, two-dimensional isoparametric elements and numerical integration, beam and frames, three-dimensional problems in stress analysis, scalar field problems, computational software applications.

REFERENCE(S) :

1. Chandrupatla, T. R., and A. D. Belegundu, 2002. *Introduction to Finite Elements in Engineering*, 3rd edition, Prentice-Hall
2. Bathe, K.-J., 1996. *Finite Element Procedures*, Prentice-Hall
3. Cook, R. D., Malkus, D. S., Plesha, M. E., and Witt, R. J., 2002. *Concepts and Applications of Finite Element Analysis*, 4th edition, Wiley
4. Zienkiewicz O.C. and Y.K.Cheung, 1990. *The Finite Element Methods in Structural and Continuum Mechanics*, London McGraw-Hill

BDA 49002

BACHELOR'S DEGREE PROJECT I

PRE-REQUISITE: MECHANICS OF MACHINES, SOLID MECHANICS II, FLUID MECHANICS II, THERMODYNAMICS II, ENGINEERING MATERIAL SELECTION AND ENGINEERING STATISTICS

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 namely PSM I and PSM II with the former being the PRE-REQUISITE for the latter and each carried out consecutively in two separate semesters.

REFERENCE(S):

1. Pejabat Pengurusan Akademik KUiTTHO, (2006), Buku Panduan Menulis Tesis, UTHM, Batu Pahat.
2. Jawatankuasa Kecil PSM FKMP (2008), Buku Log Projek Sarjana Muda, UTHM, Batu Pahat.
3. Other academic REFERENCE(S) such as scientific journals, conference proceedings, text books, patents, standards, akademik articles, legal documents, scientific magazines, formal interviews etc.

BDA 40603

VIBRATION AND NOISE

PRE-REQUISITE : MECHANICS OF MACHINE

SYNOPSIS :

Fundamental of Vibrations, Second Degree of Freedom Systems, Multiple Degree of Freedom Systems, Determination of Natural Frequency and Mode Shapes, Continuous Systems, Vibration Control, Vibration Unit and Vibration Chart Application, Vibration on Handheld, Sound Behaviour, Noise Assessment, Noise Measurement and Control, Vibration Intensity Identification, Damage Detection

REFERENCE(S) :

1. S Graham Kelly, 2000. *"Fundamentals of Mechanical Vibration"*, McGraw Hill International
2. Ver, I.L. and Beranek, L.L, 2006, "Noise and Vibration Control Engineering: Principles and Applications", 2nd Edition, John Wiley.

3. Singiresu S. Rao, 2005. *“Mechanical Vibrations”*, 4th Edition, Pearson Education
4. David A. Bies and Colin H. Hansen, 2003. *“Engineering Noise Control: Theory and practice”*, 3rd Edition, Taylor and Francis.

BD* 4*3**

ELECTIVE 1

**YEAR 4
SEMESTER II**

**BDA 40402 MANAGEMENT AND PROFESSIONAL
ETHICS**

SYNOPSIS :

Introduction and exposure of the professional ethics, philosophy and theory of ethics, values in professional ethics, responsibility of servicing, obligation to clients and third party, obligation of profession, professionals rights, observation of behavior among the professionals and the issues regarding to the professionals ethics, theory of technology management.

REFERENCE(S):

1. Mohd Janib Johari, 2001, "*Etika Profesional*", Skudai UTM.
2. Mustafa Hj. Daud, 2001, "*Etika Pengurusan*" Kuala Lumpur: Utusan Pub and Dist..
3. Mike W. Martin & Roland Schinzinger, 2005, "*Ethics In Engineering*" New York, 4th Edition, Mc Graw Hill..
4. Raymond Spier 2001, "*Ethic, Tools And The Engineer*", CRC Pres LLC.

BDA 40502 ENGINEERS AND SOCIETY

SYNOPSIS :

Development of engineering in community: Engineering and organization: role of engineer in public and private sector, responsibility of engineer, engineer as an agent of development. The relationship of human being in engineering management: Environment and engineering, ethics, professionalism and the regulations of engineering. Research and development of engineer, roles of private agency, contribution of engineer in corporate sector. Engineer in the new globalization.

REFERENCE(S):

1. Daniel L. Babcock and Lucy C. Morse, 2002, "*Managing Engineering and Technology - An Introduction to Management for Engineers*", 3rd Edition Prentice Hall Inc.
2. Abd. Rahim Abd. Manaf, 2005, "*Alam Jurutera*", Edisi 2, Penerbit Universiti Teknologi Malaya, Kuala Lumpur.

3. Thiroux Jp, 2001, *“Ethics - Theory and Practice”*, 7th Edition, Glencoe Publishing Co., California.
4. Abdul Rahim Abdul Manaf, 1996, *“Jurutera Dalam Masyarakat”*, Penerbit Universiti Malaya, Kuala Lumpur.

BDA 4904 BACHELOR DEGREE PROJECT II

PRE-REQUISITE: BACHELOR DEGREE PROJECT I

SYNOPSIS:

Bachelor’s Degree Project II (PSM II) is essentially a continuation of the work which was planned and partially completed in Bachelor Degree Project I (PSM I). At the end of this course, students are required to present the findings and the final product of their work that has been done over the two semesters.

REFERENCE(S):

1. Pejabat Pengurusan Akademik KUiTTHO, (2006), *Buku Panduan Menulis Tesis*, UTHM, Batu Pahat.
2. Jawatankuasa Kecil PSM FKMP (2008), *Buku Log Projek Sarjana Muda*, UTHM, Batu Pahat.
3. *Other academic REFERENCE(S) such as scientific journals, conference proceedings, text books, patents, standards, akademik articles, legal documents, scientific magazines, formal interviews etc.*

BD* 403 ELECTIVE II**
BD* 403 ELECTIVE III**

ELECTIVE SUBJECTS

MATERIAL ELECTIVES

BDB 40103 MATERIALS SCIENCE THERMODYNAMIC

**PRE-REQUISITE: ENGINEERING MATERIALS SELECTION,
THERMODYNAMIC 1**

SYNOPSIS:

Introduction Thermodynamic Concept and Introduction to the Application of Materials Thermodynamic System, Structure of Thermodynamic, General Strategy Correlation of Thermodynamic system, Basic Laws of Thermodynamic, Unary System, Phase Diagrams, Ternary Phase Diagram.

REFERENCE(S):

1. Robert T. DeHoff, 2007, "Thermodynamics in Materials Science: An Introduction", 7th Edition, John Wiley.
2. David V.Ragone, 1995, "Thermodynamics of Materials", Volume 1, Wiley.
3. Gaskell D.R., 2003, "Introduction to the Thermodynamic of Materials", 4th edition, Taylor & Francais.
4. Ragone D.V., 1994, "Thermodynamics of Materials", Volume I & II, Wiley.

BDB 40203 MATERIALS TESTING

PRE-REQUISITE: ENGINEERING MATERIALS SELECTION

SYNOPSIS:

Introduction To Materials Testing, Mechanical Tests, Non-Destructive Tests, Microscopy, Spectroscopy, Thermal Analysis.

REFERENCE(S):

1. Paul E. Mix, 2005, "Introduction to Nondestructive testing training guide", 2nd edition, John Wiley and Sons.
2. T.Jayakumar, Baldev Raj, M. Thavasimuthu, 2000, "Practical Non Destructive Testing", Woodhead Publishing Limited.
3. Clarke A.R, Eberhact C.N, 2002, "Microscopy Technique for Materials Science", CRC press.

4. Jenkins.R; Robert.S.L, 1996, "Introduction to X- ray powder Diffractometry", John wiley.

BDB 40303 MECHANICAL METALLURGY

PRE-REQUISITE: ENGINEERING MATERIALS SELECTION

SYNOPSIS:

Introduction to Plasticity and Elasticity Theories, Plastic and Elastic Deformation, Dislocation Theory and Hardening Mechanism, Mechanical Work Process.

REFERENCE(S):

1. Ralph, Stephens, Fatemi A., Stephens R.S., Fuchs H.O., 2001, "Metal Fatigue in Engineering ", 2nd Edition, John Willey & Sons Ins.
2. Budinski K. G dan Budinski M. K, 1999, "Engineering Materials, Properties and Selection", 6th Edition, Prentice Hall.
3. Dieter G.E., 1988, "Mechanical Metallurgy", 3rd Edition, McGraw-Hill.
4. R.W. Hertzberg, "Deformation and fracture mechanics of Engineering Materials", 4th Edition, Wiley.

BDB 40403 CORROSION AND PROTECTION

PRE-REQUISITE: ENGINEERING MATERIALS SELECTION

SYNOPSIS:

Principal and Mechanism of Corrosion, Types of Corrosion, Measurement Method and Corrosion Analysis, Atmosphere and High Temperature Corrosion, Prevention Method and Protection, Corrosive Environment and Materials Selection Method for Environmental Exposure.

REFERENCE(S):

1. Edward Ghali, 2007, "Corrosion Prevention and Protection: practical solutions", New York, John Wiley.
2. Gerhard Kreysa and Michael Schutze (ed), 2006, "Corrosion Handbook: Corrosive Agents and Their Interaction with

Materials: Volume 5: Carbonic Acid, Chlorine Dioxide, Seawater”, John Wiley.

3. Robert Baboian, 2005, “Corrosion Tests and Standards: Application and Interpretation”, ASTM International.
4. M.G. Fontana., 1992, “Corrosion Engineering”, 3rd Edition, McGraw-Hill.

BDB 40503 APPLIED METALLURGY

PRE-REQUISITE: ENGINEERING MATERIALS SELECTION

SYNOPSIS:

Defination and Characterisation of Casting Process, Types of Casting Process and Characterizations Identification, Solidification upon Casting, Casting Defects, Powder Characterisation, Production of Metal Powder, Metal Powder Compaction, Mechanical Properties and Powder Metalurgy Application.

REFERENCE(S):

1. B.J. Moniz (2003), “Metallurgy”, American Technical Publisher, Inc.
2. C.W Ammen, (2000), “Metalcasting”, Mc-Graw Hill
3. The Material Information Soceity, (2003), “ASM Handbook Vol. 7 – Powder Metal Technology and Application”, ASM International
4. James P.S., (1999), “The Science and Design of Engineering Materials”, 2nd Edition, McGraw-Hill.

BDB 40603 POLYMER AND CERAMIC

PRE-REQUISITE: ENGINEERING MATERIALS SELECTION

SYNOPSIS:

Introduction to Non-Metallic Materials, Processing of Non-Metallic Materials, Ceramic Processing, Polymer Processing

REFERENCE(S):

1. Budinski K.G & Budinski M.K., 2002, “Engineering Materials: Properties and Selection”, Prentice Hall.

2. German R. M., 1996, "Sintering Theory and Practice", Wiley-Interscience.
3. Jones and Tinker' (2000); 'Blends of Natural Rubber'; RapraTechnology Ltd.
4. Brostow W.' (2000); 'Polymer Characterization, 7th International Conferences on Polymer Characterization', Wiley-VCH.

BDB 40703 COMPOSITE

PRE-REQUISITE: ENGINEERING MATERIALS SELECTION

SYNOPSIS

Introduction to Composite Material, Reinforcements and Matrices, Properties of Composite Materials, Processing and Fabrication in Material Composite, Application for Material Composite.

REFERENCE(S):

1. Schwartz, M.M., 1997, "Composite Materials Vol 1: Properties, Nondestructive Testing and Repair", Prentice Hall.
2. Schwartz M.M., 1997, "Composite Materials Vol 2: Processing, Fabrication and Application", Prentice Hall.
3. Gibson R., 2000, "Principles of Composite Materials Mechanics", McGraw-Hill.
4. Jones R. M., 1999, "Mechanics of Composite Materials", 2nd edition, Taylor & Francis.

BDB 40803 ADVANCED MATERIALS

PRE-REQUISITE: ENGINEERING MATERIALS SELECTION

SYNOPSIS

Smart Materials and Functional Materials, Ultra lightweight Material, Bio Material, Material with nano structure, Coating and thin film.

REFERENCE(S):

1. Srinivasan A.V. & McFarland D. M., 2001, "Smart Structures Analysis and Design", Cambridge University Press.
2. Osaka T. & Datta M., 2000, "Energy Storage Systems for Electronics", Gordon and Breach Science Publishers.

3. Grainger S., 1989, "Engineering coating: Design and Application", Cambridge: Abington.
4. Edelstein A.S. & Cammarata R.C., 1996, "Nanomaterials: Synthesis, Properties and Application", IOP Publishing.

ELECTIVE GENERAL MECHANICAL

BDC 40103 CONTROL SYSTEM DESIGN

PRE-REQUISITE: CONTROL ENGINEERING

SYNOPSIS :

This course introduces students to the theory and practice of control system design. Students will learn how to design a control system using root locus technique and pole placement technique. They will also learn the principle of controllability, observability in control system and how to design the observer. System modeling and linearization of non-linear system will be learnt next. Finally, the basic principle of digital control system design will be exposed to the student.

REFERENCE(S) :

1. Ogata K., 2002, Fourth Edition, "Modern Control Engineering", Prentice Hall, New Jersey.
2. J. Dorf, 2004, "Modern Control Engineering", Addison Wesley Publishing.
3. Norman S. Nise, 2004, Fourth.Edition, "Control System Engineering", The Benjamin Cummings Publishing Co. Inc.
4. William J.Palm III, 2005, International Edition, "Introduction to Matlab 7 for Engineers", McGraw.Hill.

BDC 40203 STRESS ANALYSIS

PRE-REQUISITE: SOLID MECHANICS II

SYNOPSIS :

This course starts with introduction to stress, strain and stress-strain relationships. Then, the strain measurement methods and related instrumentation will be introduced. It moves into stress analysis by using photoelasticity method at the end of this course.

REFERENCE(S) :

1. W.C.Young, R.Budynas (2002). "*Roark's Formulas for Stress and Strain*".7th Edition. McGraw-Hill.
2. A.P.Boresi and R.J.Schmidt (2003). "*Advanced Mechanics of Materials*".6th Edition. New York: John Wiley.

3. R. Budynas (1999). "*Advanced Strength and Applied Stress Analysis*". 2nd Edition, McGraw-Hill.
4. J. W, Dally. W.F, Riley (2005), *Experimental Stress Analysis*, Fourth Edition, Knoxville, Tennessee, College House Enterprises, L.L.C.
5. A. Kuska, G. Robertson (1974). "*Photoelastic Stress Analysis*", John Wiley.

BDC 40303 KINEMATICS AND MECHANISMS

PRE-REQUISITE: DYNAMICS

SYNOPSIS:

This course introduces the concepts of kinematics and mechanisms to bachelor of mechanical engineering students. An introduction of motion analysis in terms of the particle position, velocity and acceleration will be thoroughly discussed. Example problems are presented in relevant mechanical applications to improve the comprehension in real practical mechanical engineering field. The discussion of mechanisms of dynamical systems covers the general introduction to dynamics mechanisms, cam design, gears and gear trains. On the completion of the subject, students will be able to carry out standard kinematics analysis of a system particularly for the displacement, velocity and acceleration. Students will also be able to synthesise of combination of various mechanism combinations. A skill of presenting a team work conclusion will be gained through a group project assignment.

REFERENCE(S):

1. Norton R.L., 2008. Design of Machinery: An Introduction to the Synthesis and Analysis of Mechanisms and Machines, Fourth Edition, Mc-Graw Hill.
2. Shigley J.E. and Uicker J.J, 2003. "Theory of Machines and Mechanisms", 2nd.Edition, Oxford University Press.
3. Myszka D.H., 2002, "*Machines and Mechanisms: Applied kinematics Analysis*", 2nd Edition, Prentice Hall.
4. Kenneth J. Waldron & Gary L. Kinzel, 2004. Kinematics, Dynamics, and Design of Machinery, 2nd Edition, John Wiley & Sons.

BDC 40403 FATIGUE AND FAILURE MECHANISM

PRE-REQUISITE : SOLID MECHANICS II

SYNOPSIS:

Introduction, Linear Elastic Failure Mechanism, Non-linear Failure Mechanism, Fatigue, Fatigue Crack Propagation, Microscopic Failure Mechanisms

REFERENCE(S) :

1. Barsom, J.M. dan Rolfe, S.T., 1999. *“Fracture & Fatigue Control in Structures, Application of Fracture Mechanics”*, Prentice- Hall
2. Anderson, T.L., 2005. *“Fracture Mechanics: Fundamental and Applications”*, 3rd Edition, Taylor and Francis
3. Sanford, R.J., 2003. *“Principle of Fracture Mechanics”*, Prentice-Hall
4. Lee, Y.L., Pan, J., Hathaway, R. and Barkey, M., 2005, “Fatigue testing, and analysis: theory and practice”, Butterworth-Heinemann.

BDC 40503 TRIBOLOGY

SYNOPSIS:

Introduction to tribology, viscosity lubricant, hydrodynamic lubricant, hydrostatic lubricant, elasto-hydrodynamic lubricant, surface friction, wear, tribology and engineering design.

REFERENCE(S) :

1. Hutchings, I.M., 1992. *“Tribology: Friction and Wear of Engineering Materials”*, Edward Arnold Ltd
2. Shigley, Joseph E. and Mischke, Charles R., *“Corrosion and Wear: A Mechanical Designers’ Workbook”*, McGraw-Hill Mechanical Designers Workbook Series, McGraw-Hill
3. Shigley, Joseph E. and Mischke, Charles R., *“Bearings and Lubrication: A Mechanical Designers Workbook”*, McGraw-Hill Mechanical Designers Workbook Series, McGraw-Hill
4. Bernard J. Hamrock, *“Fundamentals of Fluid Film Lubrication”*, McGraw-Hill Series in Mechanical Engineering, McGraw-Hill.

BDC 40603 ROBOTICS

SYNOPSIS :

Introduction to Robotics, Kinematics of Manipulators, Velocity Analysis and Statics of Manipulators, Dynamics of Manipulators, Trajectory Planning and Generation, Actuators and Sensors, Position and Force Control of Manipulators.

REFERENCE(S)

1. Ashitave, G., 2006."Robotics : Fundamental Concepts and Analysis",. Oxford University Press.
2. Saeed, B.N., 2001. "Introduction to Robotics: Analysis, Systems and Application", Prentice Hall.
3. Man Zhihong, 2005. "Robotics", Prentice Hall.
4. Spong, M. W., Hutchinson, S. and Vidyasagar, M., 2006, "Robot Dynamics and Control", John Wiley & Sons.

BDC 40073 MODELING AND SIMULATION

PRE-REQUISITE ENGINEERING LABORATORY

SYNOPSIS :

Physic Laws, System Modeling, Computer Simulation, State-Space Modeling, Performance and Stability System, Engineering Software, Non-linear System.

REFERENCE(S) :

1. Bohdan T. Kulakowski, John F. Gardner, 2007."Dynamic Modeling and Control of Engineering Systems", Cambridge University Press.
2. Narciso F. Macia, George J. Thaler, 2005."Modeling and Control of Dynamic Systems",Cengage Learning.
3. Frank L. Severance, 2001. "System Modeling and Simulation: An Introduction", John Wiley.
4. Dean Karnopp, Donald L. Margolis, Ronald C. Rosenberg, 2000. "System Dynamics: Modeling and Simulation Of Mechatronic System", John Wiley.
5. Ljung, Lennart, 1999."System Identification:Theory for the User", N.J. Prentice Hall.
6. Fausett, L.V.1999."Applied Numerical Analysis Using MATLAB", Prentice Hall.

MANUFACTURING ELECTIVE

BDD 40103 DESIGN FOR MANUFACTURING AND ASSEMBLY

SYNOPSIS :

Product Development in 21 Century, Customer need, functional and product concept, Design for Manufacture and Assembly concept, Design for manufacturing, Design for Assembly, Design for "X", Process and product development.

REFERENCE(S) :

1. Edward B. Magrab, Satyandra K. Gupta & F. Patrick Mccluskey, 2009, *"Integrated Product And Process Design And Development: The Product Realization Process"*, 2nd Edition, CRC Press LLC.
2. James G. Bralla, 2007, *"Handbook Of Manufacturing Processes"*, Industrial Press.
3. Chaitale A K, 2007, *"Product Design & Manufacturing"*, 4th Ed, Prentice-hall.
4. Geoffrey Boothroyd, Peter Dewhurst And Winston Knight, 2007, *"Product Design For Manufacture And Assembly"*, 3rd Ed., Marcel Dekker Inc.

BDD 40203 COMPUTER AIDED DESIGN AND MANUFACTURING

PRE-REQUISITE: CAD and Modeling, Mechanical Engineering Practices II and III

SYNOPSIS :

Introduction to CAD/CAM System, Geometric Modelling System, Standards for System Communication, Data Storage, Integration of CAD/CAM, Numerical Control, Data Communication and Local Area Network

REFERENCE(S) :

1. T.C.Chang, R.A. Wysk, H.P. Wang, 2006. *"Computer Aided Manufacturing"*, 3rd Edition, Pearson Education International.
2. P. N. Rao, 2002, *"CAD/CAM Principles and Applications"*. Tata McGraw-Hill Co. Ltd.

3. Che Abas Che Ismail, Izman Sudin, Nordin Mohd Yusof, Safian Sharif, Yahaya Ramli, 2000. "Rekabentuk Dan Pembuatan Bersepadu Computer". Penerbit Universiti Teknologi Malaysia.
4. Kunwoo Lee, 1999. "Principles Of CAD/CAM/CAE Systems", Addison Wesley Logman Inc.

BDD 40303 RAPID PRODUCT DEVELOPMENT AND MANUFACTURING

PRE REQUISITE: : CAD and MODELING

SYNOPSIS :

Introduction to Rapid Prototyping, Rapid Prototyping Process, Prototype System in liquid, Solid and Powder Based, Rapid Prototyping Format Data, Learning Case and Application on Manufacturing, Casting Process, Concurrent Engineering using Rapid Prototyping, Assessment.

REFERENCE(S) :

1. G. Andreas, 2003. "Rapid Prototyping", Hanser Gardner Publication Inc.
2. Kenneth G. Cooper, 2001. "Rapid Prototyping Technology Selection And Application", Marcel Dekker Inc.
3. Noorani, Rafiq, (2006), "Rapid Prototyping". John Wiley and Sons Inc.
4. A. Gebhardt, (2003), "Rapid Prototyping". Hanser Gardner Publications.

BDD 40403 RAPID MANUFACTURING

PRE REQUISITE: : CAD, MANUFACTURING TECHNOLOGY

SYNOPSIS :

Direct Metal Laser Sintering (DMLS), Layer-By-Layer Sintering Of Metal Powder, Functional Prototypes, Rapid Prototyping, Rapid Tooling

REFERENCE(S) :

1. Noorani, Rafiq, (2006). "Rapid Prototyping". John Wiley and Sons Inc.

2. A. Gebhardt, (2003). *"Rapid Prototyping"*. Hanser Gardner Publications.
3. EOS Gmbh (2003), *"Rapid Manufacturing: Guide to Module of Training For Technical Education"*.
4. D.T. Pham and S.S. Dimov (2001), *"Rapid Manufacturing, The Technologies and Applications of Rapid Prototyping and Rapid Tooling"*, Springer-Verlag London.

BDD 40503 CONCURRENT & REVERSE ENGINEERING

SYNOPSIS:

Concurrent Engineering Basics, Concurrent Engineering Environment, Schematic for Concurrent Engineering, Product Life-Rotation, Suppliers Interaction, Data Exchange Procedure, Basic Concepts In Reverse Engineering, Verification and Evaluation, Technical Data Generation. Design Verification, Project Implementation, Reverse Engineering Measurement Tools.

REFERENCE(S) :

1. *Rekabentuk Dan Pembuatan Bersepadu Komputer*, David D. Bedworth, Mark R. Henderson, Philip M. Wolfe, (Penterjemah: Che Abas Che Ismail, Izman Sudin, Nordin Mohd Yusof, Safian Sharif, Yahaya Ramli), Penerbit Universiti Teknologi Malaysia, 2000
2. *Principles Of CAD/CAM/CAE Systems*, Kunwoo Lee, Addison Wesley Logman Inc, 1999
3. *Concurrent Engineering Fundamentals*, Biren Prasad, Prentice-Hall Inc, 1996
4. *Implementing Concurrent Engineering In Small Companies*, Susan Carlson Skalak, Marcel Dekker Inc, 2002

BDD 40603 METAL CASTING

PRE-REQUISITE : Manufacturing Technology , Mechanical Practice Engineering II I

SYNOPSIS :

Types of casting process, mould fabrication, sand mould, tools and equipments for molding, tools for melting process, casting practice, core design, pattern design , casting inspection, casting defects, and design analysis.

REFERENCE(S) :

1. Zainal Abidin Ahmad, *“Proses Pembuatan”*, Edisi Pertama, Universiti Teknologi Malaysia, 1999.
2. C. W. Ammen, *“Metalcasting”*, 1st. Ed, McGraw Hill, 2000
3. P.L. Jain, *“Principles of Foundry Technology*, 4th Ed., Tata McGraw-Hill, 2003.
4. S. Kalpakjian, S.R. Schmid, *“Manufacturing Processes for Engineering Materials”*, 5th Ed., Prentice Hall, 2008

BDD 40703 MODERN MACHINING

SYNOPSIS :

High-Speed Machining-HSM, Chemical Machining, Electrochemical Machining-ECM, Electrical Discharge Machining-EDM, Laser Beam Machining, Electron Beam Machining, Plasma Arc Cutting, Ultrasonic Machining, Water Jet Machining, Abrasive Jet Machining.

REFERENCE(S) :

1. Hassan El-Hofy, *“Advanced Machining Processes: Nontraditional and Hybrid Machining Processes”*, New York, McGraw-Hill, 2005.
2. Hassan El-Hofy, *“Fundamentals of Machining Processes: Conventional and Nonconventional Processes”*, Taylor & Francis Group, 2007.
3. Edward M. Trent and Paul K. Wright, *“Metal Cutting”*, Fourth Edition, Butterworth Heinemann, 2000.
4. Mikell P. Groover, *“Fundamentals of Modern Manufacturing”*, Third Edition, McGraw Hill, 2007.

BDD 40803 MANUFACTURING CONTROL TECHNOLOGY

PRE-REQUISITE : CONTROL ENGINEERING

SYNOPSIS :

Introduction and exposure to control theory and concept, modeling, mechanism and production in manufacturing operation's systems which could provide related knowledge and experience in planning, scheduling and time domain control with the integration between manufacturing equipments and computer programming.

REFERENCE(S) :

1. Richard Zurawski, (2006), *Integration technologies for industrial automated systems*, Industrial Information Technologies Series 3, Boca Raton, FL: Taylor and Francis.
2. Gian Frontini and Scott Kennedy, (2003), *Manufacturing in real-time : managers, engineers, and an age of smart machines*, Amsterdam: Butterworth-Heinemann,
3. Curtis Jonson and Heidar Malki,(2002), *Control Systems Technology*, Prentice Hall.
4. Curtin D. Johnson, (2002), *Process Control Instrumentation Technology*, 5th Edition, Prentice Hall Inc.

PLANT ELECTIVES

BDE 40103 COOLING ENGINEERING AND AIR CONDITIONING

PRE-REQUISITE: THERMODYNAMICS I, THERMODYNAMICS II,

SYNOPSIS:

Introduction on the application of cooling and air conditioning plants, Air and Cooling cycles, Thermal Comfort, Heat Load Estimate (Cooling), Air Ventilation and Piping Design, Air conditioning system recovery, Noise control for air conditioning plant, Air conditioning design project.

REFERENCE(S):

1. Walter Grondzik; *Air-conditioning system design manual*, Burlington, MA: Butterworth-Heinemann, 2007.
2. Rex Miller, Mark Richard Miller and Edwin Anderson, *Refrigeration & Air conditioning: home and commercial*, 2004.
3. Edward G Pita, *Air Conditioning Principles and System: An Energy Approach*, 4th Edition, John Wiley, 2000.
4. McQuiston and Parker, *Heating, Ventilation and Air Conditioning Analysis and Design*, 3rd Edition, Wiley, 1998.

BDE 40203 ENERGY SAVING AND MANAGEMENT

PRE-REQUISITE: THERMODYNAMICS I, THERMODYNAMICS II, FLUID MECHANICS I AND FLUID MECHANICS II

SYNOPSIS:

Historical Background on Energy, Plant Engineers in Energy Management, Electrical Energy Usage, Designs/Process of Energy Transfer, HVAC system, Industrial Process and alternative generation, Management process in Energy Security, Designs for Energy Saving.

REFERENCE(S):

1. Wayne C. Turner and Steve Doty, 2007, *Energy Management Handbook*, Boca Raton, FL: Taylor & Francis

2. Clive Beggs, 2002, *Energy: Management, supply and conservation*, Oxford: Butterworth Heinemann
3. Wulfinghoff, Donald R., 1999, *Energy efficiency manual*, Wheaton, MD: Energy Institute Press
4. Culp, A.W., 1991, *Principles of Energy Conversion*, 2nd Ed., McGraw-Hill

BDE 40303 TURBO MACHINE

SYNOPSIS:

Basic thermodynamic and fluid mechanic, heat transfer in turbo machine. Principle of operation, types, operational characteristics and aspect design for turbin hydraulic, steam turbin, gas turbine, pump and compressor. Turbomachine Dimension analysis. Heat exchanger and combustion chamber study. Various application in of transport sector (aero engines, gas turbines for ship and train propulsion) and the energy sector (steam and gas turbines for power generation) as industry forwards.

REFERENCE(S):

1. Karassik IJ, 2000, "Pump Handbook", 3rd Edition, Mc Graw Hill.
2. Amer Nordin Darius, 1993, "Pengenalan Hidrodinamik Turbin Air", Dewan Bahasa dan Pustaka.
3. Dixon S.L, 1995, "Fluid mechanics and Thermodynamics of Turbomachinery", Butterworth Heinemann.
4. Merle C. Potter and David C. Wiggert, 1997, "Mechanics of Fluids", 2nd Edition, Prentice Hall.

BDE 40403 COMPUTATIONAL FLUID DYNAMICS

PRE-REQUISITE: FLUID MECHANICS II

SYNOPSIS:

The CFD course content include introduction and history of CFD, the governing fluid flow equations, the concept of turbulence and its modeling, numerical methods in CFD, errors and uncertainties in CFD, and applications of CFD.

REFERENCE(S):

1. Versteeg H. K. and Malalasekera W., (2007), *An Introduction To Computational Fluid Dynamics: The Finite Volume Method, 2nd Edition*, Essex, Longman Scientific & Technical.
2. Chung, T.J., (2002), *Computational Fluid Dynamics*, Cambridge University Press, Australia.
3. Rhodes, N. (Editor), (2001), *Computational Fluid Dynamics in Practice*, Professional Engineering Publishing, London.
4. Anderson, J.D., (1995), *Computational Fluid Dynamics: The Basics with Applications*, McGraw-Hill, New York.
5. Munson, B. R., Young, D. F., Okiishi, T.H., (2002), *Fundamentals of Fluid Mechanics 4th Edition*, USA, John Wiley & Sons, Inc.

BDE 40503

FLUID POWER

PRE-REQUISITE: FLUID MECHANICS II, CONTROL ENGINEERING

SYNOPSIS:

Introduction to fluid power, hydraulic and pneumatic system components, hydraulic circuit design, pneumatic circuit and application, pollution source, effect and control of hydraulic systems

REFERENCE(S):

1. Anthony Esposito, 2003, *Fluid Power with Applications*, 6th Edition, Prentice Hall.
2. Anton H. Hehn. , 1997, *Fluid Power Handbook. Vol.1: System Design, Maintenance and Troubleshooting*, Gulf Publishing Company.
3. Robert P. Kokernak, 1994, *Fluid Power Technology*, Merril.
4. James A. Sullivan, 1989, *Fluid Power: Theory and Applications*, 3rd Edition, A Reston.

BDE 40603 INTERNAL COMBUSTION ENGINE

PRE-REQUISITE: THERMODYNAMICS I ,THERMODYNAMICS II

SYNOPSIS:

This course discusses the operation and designs of various types of internal combustion engines (ICE), using the application of applied 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, Engine Cycles, Spark Ignition Engines, Compression Ignition Engines, Conventional and Alternative Fuels for ICE, Emissions, and ICE testing.

REFERENCE(S):

1. Heywood, J. B., (1988) *Internal Combustion Engine Fundamentals*, Singapore, McGraw Hill Book Co.
2. Pulkrabek, W. W. (2003) *Engineering Fundamentals of the Internal Combustion Engine*, Prentice Hall
3. Ferguson, C. R. and Kirkpatrick, A. T., (2001) *Internal Combustion Engine: Applied Thermoscience*, USA, John Wiley & Sons, Inc.
4. Stone, R. (1993) *Introduction to Internal Combustion Engines*, SAE International

BDE 40703 MAINTENANCE AND SAFETY ENGINEERING

PRE-REQUISITE: THERMODYNAMICS I, THERMODYNAMICS.II, STATISTICS

SYNOPSIS:

Topics discussed in this course cover basic safety, procedures to reduce accident rates and also hazard identifications in industrial plants.

REFERENCE(S):

1. John Ridley and John Channing; *Safety at work*, Oxford: Elsevier, 2008.
2. Roger L. Brauer; *Safety and health for engineers*, Hoboken, NJ: John Wiley, 2006.

3. Michael Speegle; *Safety, health and environmental concepts for the process industry*, Berne, NY: Uhai Pub., 2005.
4. Lars Harms Ringdahl ; *Safety analysis : Principles and practice in occupational safety*, Taylor & Francis , London 2001

BDE 40803 AERODYNAMICS

PRE-REQUISITE: FLUID MECHANICS II

SYNOPSIS:

Introduction to aerodynamics, general principle and equations of aerodynamic, vortex and lift, flow around the cylinder, boundary layer, Reynolds number, Kutta-Jackowki theorem, lift on an aerofoil, friction analysis, subsonic and supersonic flow, Mach number , wind tunnel.

REFERENCE(S):

1. Anderson J, 2006, *Fundamental of Aerodynamic*, Mc Graw Hill.
2. J.J Bertin, M.L Smith, 1995, *Aerodynamic For Engineers*, Prentice Hall.
3. L.J Clancy, 1994, *Aerodynamics*, Pitman.
4. Kuethe, 1992, *Foundations of Aerodynamics*, Willey.

BDE 40903 THERMAL ENVIRONMENTAL DESIGNS

PRE-REQUISITE: THERMODYNAMICS I, THERMODYNAMICS II

SYNOPSIS:

Historical background, Thermodynamics theories, Heat and energy transfers and changes

REFERENCE(S):

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

TEXTILE ELECTIVES

BDF 40103 TEXTILE MATERIAL SCIENCE

PRE-REQUISITE: MATERIAL SCIENCE

SYNOPSIS:

This course is prepared for student to learn about natural fibers, blended fibers, synthetic fibers, mechanical and physical properties of fibers, the effect of moisture and temperature on fibers and fibers identification.

REFERENCE(S):

Sara J. Kadolph, 2007, Textiles, Pearson Education
B. Wulforth, 2006, Textile Technology, Hanser Gardner Publication
B. C Goshwani, 2004, Textile Sizing, Marcel Dekker
Fung. W, 2001, Textiles in Automotive Engineering, Cambridge
Technomic

BDF 40203 YARN MANUFACTURING TECHNOLOGY

SYNOPSIS:

Fiber Properties, Fiber Morphology, Physical Of Fiber, Chemical Structure Of Natural Fiber, Blended Fiber And Synthetic Fiber, Staple Yarn Manufacturing, Synthetic Yarn Texturing And Blended Yarns.

REFERENCE(S):

1. Sara, J., 2007, Textiles 10th Edition. NJ: Pearson Education, Upper Saddle River.
2. Hearle J.W.S, 2003, Yarn Texturing Technology, Woodhead Publishing
3. B. Wulforth, 2006, Textile Technology, Hanser Gardner Publication.
4. B. C Goshwani, 2004, Textile Sizing, Marcel Dekker.

BDF 40303 FABRIC MANUFACTURING TECHNOLOGY

PRE-REQUISITES : YARN MANUFACTURING TECHNOLOGY

SYNOPSIS:

Weft Knitting and Warp Knitting System, Weft Knitting and Warp Knitting Elements, Knitted Fabric Structure, Preparation for Weaving Yarn, Woven Fabric Design and Structure, Weaving Operations.

REFERENCE(S):

1. Sara, J., (2007). *Textiles 10th Edition*. NJ: Pearson Education, Upper Saddle River.
2. Kim, J-O., et al. (2006). *The Textile and Apparel Industry in Developing Countries*. Woodhead Publishing, Cambridge.
3. Wulforth, B., et al. (2006). *Textile Technology*. OH: Hanser Gardner Publications, Cincinnati.
4. Slater, K., (2003). *Textiles and the Environment*. Woodhead Publishing, London.

BDF 40403 WEAVING ENGINEERING

SYNOPSIS:

Weaving Industry, Yarn Preparation for Weaving Process, Primary Weaving Construction, Secondary Weaving Construction, Woven Fabric Properties, Types of Woven Fabric.

REFERENCE(S):

1. Kadolph, S.J., (2007). *Textiles*. Pearson Education.
2. Wulforth, B., (2006). *Textile Technology*. Hanser Gardner Publication.
3. Goshwani, B.C., (2004). *Textile Sizing*. Marcel Dekker.
4. Kim, J.O., (2006). *The Textile and Apparel Industry in Developing Countries*. Cambridge Woodhead Publishing.

PACKAGING ELECTIVES

BDG 40103 PRINCIPLES OF PACKAGING ENGINEERING

SYNOPSIS:

Introduction. Functions and basic materials of packaging. Basic conceptual for packaging and package system. Basic element of physical distribution. Characterisation and differentiation of product sensitivity. Selection and performance of package system. Packaging as marketing tools. Packaging and package graphic design.

REFERENCE(S) :

1. Davis, G., 1995, "*Packaging Converting Machinery Components*", Packaging Machinery Manufacturing, USA
2. Eldrel, E., 1993, "*Packaging Printing*", Jelmar Publishing.
3. Hanlon, J., 1992, "*Handbook of Packaging Engineering*", Technomic Publishing, New York.
4. C. Glenn Davis., 1990, "*Introduction to Packaging Machinery*", Packaging Machinery Manufacturers Institute, USA.

BDG 40203 PACKAGING EQUIPMENT AND OPERATION

PRE-REQUISITE : CONTROL ENGINEERING, INDUSTRIAL ENGINEERING, MANUFACTURING TECHNOLOGY.

SYNOPSIS :

Operation and elements of packaging machinery. Packaging system base on pneumatics and hydraulics. Printing principles.

REFERENCE(S) :

1. Brody, A.L and Marsh, 1997, "*The Wiley Encyclopedia of Packaging Technology*", J. Wiley & Sons, Inc.
2. C. Glenn Davis., 1995, "*Introduction to Packaging Machinery*", Packaging Machinery Manufacturers Association. U. S. A.
3. Eldrel, E., 1993, "*Packaging Printing*": Jelmar Publishing.
4. Hanlon, J., 1992, "*Handbook of Packaging Engineering*", Technomic Publishing.

BDG 40303 PACKAGING SYSTEM I

**PRE-REQUISITE : MATERIAL SCIENCE, MATERIAL
ENGINEERING SELECTION.**

SYNOPSIS :

Packaging Material characteristic and test. Performance and test for flexible and rigid container. Basic elements for package specification. Manufacturing, production, characteristic, performance, design, test and specification of paper base package material.

REFERENCE(S) :

1. Brody, A.L and Marsh.,1997, "*The Wiley Encyclopedia of Packaging Technology*", J. Wiley & Sons, Inc
2. Eldrel, E., 1993, "*Packaging Printing*", Jelmar Publishing
3. Hanlon, J., 1992, "*Handbook of Packaging Engineering*", Technomic Publishing, New York
4. Bakker, M., 1986, "*Encyclopedia of Packaging Technology*", J. Wiley & Sons, Inc

BDG 40403 PACKAGING SYSTEM II

**PRE-REQUISITE : MATERIAL SCIENCE, MATERIAL
ENGINEERING SELECTION.**

SYNOPSIS :

Packaging Material characteristic and test. Performance and test for flexible and rigid container. Basic elements for package specification. Manufacturing, production, characteristic, performance, design, test and specification of plastic, glass and metal base package materials.

REFERENCE(S) :

1. Brody, A.L and Marsh.,1997, "*The Wiley Encyclopedia of Packaging Technology*", J. Wiley & Sons, Inc
2. Eldrel, E., 1993, "*Packaging Printing*", Jelmar Publishing
3. Hanlon, J., 1992, "*Handbook of Packaging Engineering*", Technomic Publishing, New York
4. Bakker, M., 1986, "*Encyclopedia of Packaging Technology*", J. Wiley & Sons, Inc

BDG 40503

PACKAGING DEVELOPMENT SYSTEM

PRE-REQUISITE : PRINCIPLES OF PACKAGING, PACKAGING EQUIPMENT AND OPERATION, PACKAGING SYSTEM I AND PACKAGING SYSTEM II

SYNOPSIS :

Packaging development system concept. Development needs, design, cost and economy. Evolution. National packaging standards and regulations.

REFERENCE(S) :

1. Ulrich, K., 2000, *"Product Design and Development"*, Mc Graw-Hill
2. Hanlon, J., *Handbook of Packaging Engineering*, Technomic Publishing, 1992
3. Paine, F. A., *The Packaging User's Handbook*, Backie and Son Ltd, 1991
4. Leornad, Edmund., 1990, *"Packaging Specification Purchasing and Quality Control"* Marcel Dekker

BDG 40603

PACKAGING DYNAMICS

PRE-REQUISITE : MACHINE MECHANICS, DYNAMICS AND CONTROL ENGINEERING.

SYNOPSIS :

Acceleration theory, vibration, damping, spring and shock. Product failure. Cushioning characteristics and design. Evaluation of cushioning system performance. Free fall / drop test, shock and vibration test.

REFERENCE(S) :

1. Brody, A.L and Marsh., 1997, *"The Wiley Encyclopedia of Packaging Technology"*, J. Wiley & Sons, Inc
2. Hanlon, J., 1992, *"Handbook of Packaging Engineering"*, Technomic Publishing
3. Paine, F. A., 1991, *"The Packaging User's Handbook"*, Backie and Son Ltd

4. Richard K. Brandenburg & Julian June-Ling Lee.,1985,
"Fundamentals of packaging Dynamics", School of Packaging,
Michigan State University, MTS System Corporation

**YEAR 4
SEMESTER II**

BDA 40402 MANAGEMENT AND PROFESIONAL ETHIC

SYNOPSIS :

Introduction and exposure of the professional ethics, philosophy and theory of ethics, values in professional ethics, responsibility of servicing, obligation to clients and third party, obligation of profession, professionals rights, observation of behavior among the professionals and the issues regarding to the professionals ethics, theory of technology management.

REFERENCE(S):

1. Mohd Janib Johari, 2001, "*Etika Profesional*", Skudai UTM.
2. Mustafa Hj. Daud, 2001, "*Etika Pengurusan*" Kuala Lumpur: Utusan Pub and Dist..
3. Mike W. Martin & Roland Schinzinger, 2005, "*Ethics In Engineering*" New York, 4th Edition, Mc Graw Hill..
4. Raymond Spier 2001, "*Ethic, Tools And The Engineer*", CRC Pres LLC.

BDA 40502 ENGINEER AND SOCIETY

SYNOPSIS :

Development of engineering in community: Engineering and organization: role of engineer in public and private sector, responsibility of engineer, engineer as an agent of development. The relationship of human being in engineering management: Environment and engineering, ethics, professionalism and the regulations of engineering. Research and development of engineer, roles of private agency, contribution of engineer in corporate sector. Engineer in the new globalization.

REFERENCE(S):

1. Daniel L. Babcock and Lucy C. Morse, 2002, "*Managing Engineering and Technology - An Introduction to Management for Engineers*", 3rd Edition Prentice Hall Inc.
2. Abd. Rahim Abd. Manaf, 2005, "*Alam Jurutera*", Edisi 2, Penerbit Universiti Teknologi Malaya, Kuala Lumpur.

3. Thiroux Jp, 2001, *“Ethics - Theory and Practice”*, 7th Edition, Glencoe Publishing Co., California.
4. Abdul Rahim Abdul Manaf, 1996, *“Jurutera Dalam Masyarakat”*, Penerbit Universiti Malaya, Kuala Lumpur.

BDA 49104 BACHELOR’S DEGREE PROJECT II

PRE-REQUISITE: BACHELOR’S DEGREE PROJECT I

SYNOPSIS:

Bachelor’s Degree Project II (PSM II) is essentially a continuation of the work which was planned and partially completed in Bachelor Degree Project I (PSM I). At the end of this course, students are required to present the findings and the final product of their work that has been done over the two semesters.

REFERENCE(S):

1. Pejabat Pengurusan Akademik KUiTTHO, (2006), Buku Panduan Menulis Tesis, UTHM, Batu Pahat.
2. Jawatankuasa Kecil PSM FKMP (2008), Buku Log Projek Sarjana Muda, UTHM, Batu Pahat.
3. Other academic references such as scientific journals, conference proceedings, text books, patents, standards, akademik articles, legal documents, scientific magazines, formal interviews etc.

BD* 4*3 ELECTIVE II**
BD* 4*3 ELECTIVE III**