

*Bachelor of Electronic Engineering (Mechatronic) with Honours*

**Bachelor of Electronic Engineering (Mechatronic)  
with Honours**

*Faculty of Electrical and Electronic Engineering*

*Bachelor of Electronic Engineering (Mechatronic) with Honours*

YEAR 1

YEAR 1

SEMESTER 1

**UWS 10103            NATIONHOOD AND CURRENT DEVELOPMENT OF 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.

**REFERENCES:**

1. Zahrul Akmal Damir, 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 Damir (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.

**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

**REFERENCES:**

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.

**REFERENCES:**

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.

**UQ\* 1\*\*01**

**C0-CURRICULUM 1**

**SYNOPSIS:**

Kursus ini ditawarkan dalam pelbagai bentuk aktiviti pilihan untuk pelajar peringkat Sarjana Muda dan Diploma. Lapan bidang aktiviti yang ditawarkan adalah Pengucapan Awam, Keusahawanan, Sukan, Khidmat Komuniti, Kesukarelawanan, Kepimpinan, Kebudayaan dan Daya Usaha dan Inovasi.

**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 wide range of academic activities.

**REFERENCES:**

1. n.a (2004). *Koleksi Kertas Soalan MUET Oktober 2003*. Kuala Lumpur : Pearson Malaysia.
2. Ng. K. S. et al. (2000). *Study Skills for the Malaysian University English Test*. Kuala Lumpur : Federal Publication.
3. Pfeiffer, W.S. (2000) *Technical Writing: A Practical Approach*. New Jersey. Prentice Hall.
4. Teoh, S. A. & Zainab Mohd. Noor (2000). *Test-Taking Strategies for MUET*. Kuala Lumpur : Penerbit Fajar Bakti.
5. Walker, E. (2004) *Grammar Practice*. Kuala Lumpur. Pearson Education Malaysia.

**UWB 1\*\*02 MALAY LANGUAGE**

**SYNOPSIS:**

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

**REFERENCES:**

1. Asmah Hj. Omar. (2005). Susur Galur Bahasa Melayu. DBP : KL
2. Asmah Hj. Omar. (2003). Nahu Melayu Mutakhir. DBP : KL
3. Abdul Hamid Mahmood. (1992). Menguasai Ejaan Bahasa Malaysia Dengan Cepat. DBP: KL
4. Abdul Hamid Mahmood. (1998). Menguasai Ejaan Bahasa Melayu. DBP : KL
5. Edward S. King. (1998). Speak In Malay. Times Publication : KL

**BWM 10103 ENGINEERING MATHEMATICS 1**

**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  $0/0$ ,  $\infty/\infty$ ,  $0 \cdot \infty$ ,  $0^0$ ,  $\infty^0$ ,  $1^\infty$ ,  $\infty - \infty$ . 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.

REFERENCES:

1. Abd. Wahid Md. Raji, Hamisan Rahmat, Ismail Kamis, Mohd Nor Mohamad, Ong Chee Tiong. (2003). "Calculus for Science and Engineering Students." Malaysia: UTM Publication.
2. Anton, H., Bivens, I., Davis, S. (2005). "Calculus." 8<sup>th</sup> Ed. USA: John Wiley & Sons, Inc.
3. Smith, R. T., Minton, R. B. (2006). "Calculus: Concept & Connection." New York: McGraw-Hill.
4. Larson, R. E., Hostetler, R. P., Edward, B. H. (2002). "Calculus with Analytic Geometry." 6<sup>th</sup> Ed. USA: Houghton Mifflin Company.
5. Goldstein, Larry, Lay, David, Schneider, David. (2004). "Calculus and its Applications. Upper Saddle River, NJ : Pearson Education.

**BEC 10102                      COMPUTER PROGRAMMING**

SYNOPSIS:

This course is intended to provide a study of programming concept through the use of a high level programming language such as C++. Students will learn to design, code, debug, test and document well-structured programs based on technical and engineering problems. Topic covered; Software Development Method, programming language basics, data types , input and output operations, the use of arrays, string, pointers and structures, file processing handling and advance applications.

REFERENCES:

1. Delores M. Etter, Jeanine A. Ingber. Engineering Problem Solving with C++, 2<sup>nd</sup>. Edition. Prentice-Hall, 2007.
2. Jeri R. Hanly, Elliot B. Koffman. Problem Solving and Program Design in C, 4<sup>th</sup>. Edition. Addison-Wesley, 2004.
3. Katupitiya, Jayantha, Bentley, Kim. Interfacing with C++, Springer, 2006.
4. Jeri R. Hanly, Elliot B. Koffman. C Programming for Engineers, 2<sup>nd</sup> Edition, Addison-Wesley, 2004.
5. H. M. Deitel and P. J. Deitel, C: How to Program, 4<sup>th</sup> Edition, Prentice-Hall, 2004

**BEE 10202 ENGINEERS AND SOCIETY**

**SYNOPSIS:**

This course concerns with the profession of engineers, engineers' role and professional bodies governing the profession. Relationship of engineering and organization, and society at large are covered in this course. Ethics and professionalism cover the code of ethics and moral reasoning. Emphasis is given to the ethical issues in engineering practice; also intellectual property and anti-corruption concept. Next are the responsibilities of engineers and their rights at workplace and team work. Commitment in providing service is taught which involves safety, environmental and global issues. Last are the engineering acts, regulations and standard.

**REFERENCES:**

1. Mike W. Martin, Ethics in Engineering, 4th. Ed. McGraw Hill, 2005
2. Roland Schinzinger and Mike W. Martin, Introduction to Engineering Ethics, McGraw Hill, 2000.
3. Charles B. Fleddermann, Engineering Ethics, 2nd Edition, Prentice Hall 2004
4. John D. Kemper and Billy R. Sanders, Engineers and Their Profession, 5th Ed. Oxford University Press, 2001
5. Daniel A. Vallero, P. Aarne Vesilind, Socially Responsible Engineering : Justice in Risk Management, John Wiley, 2006

**BEL 10103 ELECTRIC CIRCUITS**

**SYNOPSIS:**

The first course covers the basic theory of circuit analysis. Topics include basic electrical circuit theory and laws, electrical circuit analysis techniques and concepts, energy storage elements, network theorems, review of techniques to solve simultaneous equations, nodal and mesh circuit analysis, dependent sources, Thevenin's and Norton's equivalent circuits, maximum power transfer, solution of first and second order networks to switched DC inputs, natural responses, AC circuit steady-state response analysis, steady state power calculations in circuit analysis. Computer assisted analysis of electrical circuits. This course has an integrated laboratory.

**REFERENCES:**

1. J. David Irwin; Basic Engineering Circuit Analysis, 8th Ed.; John Wiley & sons ; 2005.
2. Alexander, C. K. & Sadiku, M.N.O.; Fundamentals of Electric Circuits; McGraw-Hill International Editions; 2007.
3. James W. Nilsson & Susan A. Riedel; Electric Circuits; Prentice-Hall; 2008
4. William H Hayt & Jack E Kemmerly, Engineering Circuit Analysis, McGraw Hill, 2002
5. Richard C. Dorf & James A. Svoboda; Introduction to Electric Circuits, John Wiley & Sons; 2004



YEAR 1

SEMESTER 2

**UWS 10202            ETHNICS 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.

**REFERENCES :**

1. Shamsul Amri Baharuddin (2007). "Modul Hubungan Etnik." Shah Alam: Universiti Teknologi MARA.
2. Zaid Ahmad, Ho Hui Ling, Sarjit Sing Gill dll (2006). "Hubungan Etnik di Malaysia." Shah Alam : Oxford Fajar Sdn. Bhd.
3. John Rex (1985). "Hubungan Ras Dalam Teori Sosiologi." Kuala Lumpur : Dewan Bahasa dan Pustaka..
4. Lembaga Penyelidikan Undang-undang (2003). "Perlembagaan Persekutuan : (hingga 15hb.Ogos 2003)." Petaling Jaya : International Law Book Services.
5. Nazaruddin Mohd Jali, Ma'rof Redzuan, Asnarulkhadi Abu Samah dan Ismail Mohd Rashid (2005). "Pengajian Malaysia." Petaling Jaya: Prentice Hall.

**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, teamwork, 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.

REFERENCES:

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 engineering*. Malaysia: Prentice Hall.

**UQ\* 1\*\*01**

**CO-CURRICULUM II**

SYNOPSIS:

Kursus ini ditawarkan dalam pelbagai bentuk aktiviti pilihan untuk pelajar peringkat Sarjana Muda dan Diploma. Lapan bidang aktiviti yang ditawarkan adalah Pengucapan Awam, Keusahawanan, Sukan, Khidmat Komuniti, Kesukarelawananan, Kepimpinan, Kebudayaan dan Daya Usaha dan Inovasi.

**UWS 10303**

**MALAYSIAN STUDIES AND CULTURE**

SYNOPSIS:

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

REFERENCES:

1. Abdul Halim Nasir (2004). "Mosque Architecture in the Malay World." Bangi : Penerbit Universiti Kebangsaan Malaysia.
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.

**BWM 10303                      ENGINEERING MATHEMATICS II**

**SYNOPSIS:**

This course will provide students in depth understanding of First Order Differential Equation: Formation. Methods of solution: separating the variables, homogeneous, linear and exact. Initial value problem. Application: electric circuit. Second Order Linear Differential Equation with Constant Coefficients: Methods of solution: method of undetermined coefficient and method of variation of parameter. Application of second order linear differential equation with constant coefficients in electric circuit. System of First and Second Order Differential Equations: Eigen value and eigen function. Laplace Transform: Definition. Linearity. First shift theorem. Multiplying by  $t$ . Unit step function and Delta function. Second shift theorem. Inverse Laplace Transform: Definition and properties. Convolution theorem. Solve initial and boundary value problems for linear differential equation with constant coefficients which involve unit step function, Dirac Delta function and periodic function. Fourier Series: Fourier series in interval period  $2\pi$ . Odd and even function. Fourier series in interval  $(-l, l)$ . Half range series. Introduction of Fourier transform. Series Solution for Differential Equation: Power series method. Legendre polynomial. Bessel equation.

**REFERENCES:**

1. Abd. Wahid Md. Raji, Mohd Nor Mohamad. (2008). *Differential Equations for Engineering Students*. Malaysia: Comtech Marketing Sdn. Bhd.
2. Kuldeep Singh. (2003). *Engineering Mathematics through Applications*. New York: Industrial Press.
3. Peter V. O'Neil. (2003). *Advanced Engineering Mathematics*. Thomson Brooks/Cole.
4. Phang, C., Phang, P. (2007). *Engineering Mathematics II BSM 1933 (Learning Module)*. Malaysia: UTHM Publication.
5. Robert J. Lopez. (2001). *Advanced Engineering Mathematics*. Boston: Addison Wesley.

**BEL 10203                      ANALOG ELECTRONICS**

**SYNOPSIS:**

This course provides the student with the basic knowledge necessary to understand the operation and application of semiconductor devices in discrete electronic circuits. The course covers an introduction to the semiconductor theory. Emphasis is on the basic electronic semiconductor devices such as the diode, the bipolar junction transistor (BJT), the field-effect transistor (FET). Biasing, small-signal and large signal analysis and the principles employed in the design of electronic circuits are included. Analytical, graphical, and computer tools are used to explain the basic building blocks of analog circuits. Topics also include Frequency Response of BJT and JFET, multistage amplifiers, cascade and cascode configurations, Darlington pair, Differential amplifier, Power amplifiers: class A, B and AB.

**REFERENCES:**

1. R.Boylestad, L. Nashelsky; Electronic Devices and Circuit Theory, 9th Edition; Prentice Hall; 2006.
2. Donald A. Neamen; Microelectronics Circuit Analysis and Design, 3<sup>rd</sup> Ed.; McGraw Hill, 2007.
3. Thomas L. Floyd, Electronic Devices, 7<sup>th</sup> Ed., Prentice Hall, 2005.
4. Albert Paul Malvino, Electronic Principles, 7<sup>th</sup> Ed., McGraw Hill, 2007.
5. Robert T.Paynter; Introductory Electronics Devices and Circuits, Conventional Flow Version, 7<sup>th</sup> Edition; Prentice Hall; 2006.

**BEE 10403                      ELECTRICAL TECHNOLOGY**

**SYNOPSIS:**

Electrical principles are an important aspect of an electrical engineering study that involves the basic operations and the characteristic of the various dc and ac electrical circuitry and electrical machines. In general when a study of the electrical technology, the student will be able to tackle problems in examination or in the actual electrical industrial environment with regard to various areas such as the single phase and three phase electrical circuits, electromagnetism, magnetic circuits, the resistor, inductor and capacitor as an electrical devices or component, and the dc and ac electrical machines.

REFERENCES:

1. Edward Hughes, *Electrical Technology*; Longman, 1977.
2. Theodore Wildi, *Electrical Machines, Drives and Power Systems*; Prentice Hall, 2006.
3. Chapman Stephen J., *Electric Machinery and Power System Fundamentals*; McGraw-Hill, 2002.
4. Edward Hughes, *Hughes Electrical and Electronic Technology*, 9<sup>th</sup> Ed., Prentice Hall, 2005.
5. J. B. Gupta, *Electrical Technology*, S. K. Kataria, 2004.

**BEE 10501                      ENGINEERING PRACTICES**

SYNOPSIS:

The course is developed to give the required knowledge regarding electrical wiring and installation. It will develop the capability of carrying out electrical wiring activities up to a certain level of competency. The topics covered are the domestic wiring and installation, industrial wiring and installation. In the designing of electronic circuits' aspects, OrCAD will be used as it will help in making the schematic entry, doing FPGA synthesis, digital, analog, mixed-signal simulation and printed circuit board layout. PLC will be used to provide the programming knowledge for the controlling of the basic and advance automation system.

YEAR 2

YEAR 2

SEMESTER 1

**UWB20302                    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 and analytical report. 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. Prior to that, students will also be trained to polish up their skills in narrative and descriptive essays using accurate grammar, vocabulary and sentence structure.

**REFERENCES:**

1. Finkelstein, J. (2008). *Pocket Book of technical writing*. 3<sup>rd</sup> 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*. 3<sup>rd</sup> ed. New Jersey: Prentice Hall.

**BWM20403                    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 Theorem. Surface integrals of scalar and vector field. Gauss's Theorem and Stokes Theorem.

REFERENCES :

1. Abd Wahid Md Raji, Phang Chang, Phang Piau, (2007) Engineering Mathematics III BSM2913. Penerbit UTHM. (Learning Module)
2. Howard Anton, Irl Bivens, Stephen Davis (2002). Calculus (7<sup>th</sup> Edition). New York:
3. John Wiley. Straud, K.A. (1996). Further Engineering Mathematics (3<sup>rd</sup> Edition). England: Macmillian Publication
4. Robert T. Smith, and Roland B. Minton (2007). Calculus Early Transcendental Function (3<sup>rd</sup> Edition). New York: McGraw-Hill.
5. James Stewart (2003). Calculus. USA. Thomson Learning Inc.

**BPK20802                      ENTREPRENEURSHIP**

SYNOPSIS:

Kursus ini memberi pendedahan kepada pelajar tentang aspek asas keusahawanan. Kursus ini meliputi empat modul utama iaitu pemupukan budaya keusahawanan, peluang dan rancangan perniagaan, praktikum keusahawanan dan pembentangan laporan aktiviti keusahawanan.

REFERENCES:

1. Kementerian Pengajian Tinggi (2007) 'Asas Pembudayaan Keusahawanan'. Penerbit UUM;
2. Marc J. Dollinger. – 3<sup>rd</sup> 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. 2<sup>nd</sup> Edition



**BEL 20303                      DIGITAL ELECTRONICS**

**SYNOPSIS:**

This course is the first course in digital electronics. Beginning with representing physical values in digital form using binary, octal and hexadecimal numbering system, conversion between these numbering systems, also representation of values in codes such as BCD and Gray. This is followed by representing negative values in binary, binary arithmetic and BCD addition. Basic logic gates and symbols are introduced as well as Boolean expressions, truth tables and timing diagrams. Combining basic gates to implement certain function, and analyzing circuits to obtain its Boolean expression, simplify using Boolean theorem and Karnaugh-map approach. In digital arithmetic, adder circuits are introduced, starting from half adder, full adder and the design of the carry look ahead adder and BCD adder. Then, on to MSI logic circuits such as encoder, decoder, multiplexer and demultiplexer. Memory elements such as latches and flip-flops are introduced followed by flip-flop applications in counters and registers. ADCs and DACs are also included. The final topic is on integrated circuit family characteristic and technology.

**REFERENCES:**

1. J. Floyd, Digital Fundamental, Merrill MacMillan, 2006.
2. J. Tocci, Digital System, Principles and Application, Prentice Hall, 2006
3. M. Morris Mano, Charles R. Kime, Logic and Computer Design Fundamentals, 2<sup>nd</sup> Ed., Prentice Hall, 2001.
4. Milos D. Ercegovac, Thomas Lang and Jaume H. Moreno, Introduction to Digital System, John Wiley, 1999.
5. Floyd, Digital Fundamentals with VHDL, Prentice Hall, 2003.

**BEF 25503                      POWER SYSTEMS**

**SYNOPSIS:**

This course is arranged to provide students understanding of electrical power systems. The course is divided into three major parts: fundamental of single-phase and three-phase power distributions, utility power system structures, and industrial power systems. The essential basic knowledge of single-phase and three-phase power systems will be covered at the beginning of the course. Subsequently, electric utility system comprises all the apparatus used in the generation, transmission, and distribution of electric energy will be provided. Finally, introduction to the industrial power system will be made together with a range of technical issues that might arise during the design and utilisation of electrical energy.

REFERENCES:

1. J Theodore Wildi. Electrical Machines, Drives, and Power Systems, 6th Edition, Pearson Education International, 2006.
2. King Alexander C & Knight William. Uninterruptible Power Supplies and Standby Power Systems, McGraw-Hill, 2003.
3. Dugan Roger C, McGranaghan M F, Santoso S and Beaty H Wayne. Electrical Power Systems Quality, 2nd Edition, McGraw-Hill, 2003.
4. R.B. Theodore. Electrical Systems Design, Prentice Hall, 2003.
5. T. A. Short. Electric Power Distribution Equipment and Systems, Taylor & Francis Group, 2006.

**BEH 2010**

**MECHATRONIC ENGINEERING LABORATORY I**

SYNOPSIS:

To give students hands-on experience in understanding the material presented in the following courses:

- BEL 10203 Analog Electronics
- BEL 20303 Digital Electronics

REFERENCES:

1. R.Boylestad, L. Nashelsky; Electronic Devices and Circuit Theory, 9th Edition; Prentice Hall; 2006.
2. Donald A. Neamen; Microelectronics Circuit Analysis and Design, 3<sup>rd</sup> Ed.; McGraw Hill, 2007.
3. Thomas L. Floyd, Electronic Devices, 7<sup>th</sup> Ed., Prentice Hall, 2005.
4. J. Floyd, Digital Fundamental, Merrill MacMillan, 2006.
5. J. Tocci, Digital System, Principles and Application, Prentice Hall, 2006

**BEH20201**

**MECHATRONIC ENGINEERING PRACTICES**

SYNOPSIS:

Student will be introduced to the PC-based controller using PCI card. This covered the development of GUI and programming using Visual Basic and C++. Also, the advance implementation of PLC is demonstrated to fulfill the industrial needs in various applications.

REFERENCES:

1. Franklin and Powell, J, Digital Control of Dynamic Systems, 3<sup>rd</sup> Edition, Addison-Wesley, 1998.
2. Phillips and Nagle, Digital Control System Analysis and Design, Prentice Hall, 1998.
3. Franklin and Powell, Feedback Control of Dynamic Systems, International Ed., 2002.
4. Landau and G. Zito, Digital Control Systems: Design, Identification and Implementation, Springer Verlag, 2005.
5. Kohn, Digital Control, John Wiley & Sons Inc, 2006.

## **BEH 20302                    INDUSTRIAL AUTOMATION SYSTEMS**

### **SYNOPSIS:**

Student will be introduced to actuator in automation system, industrial sensors, ladder diagram, pneumatic control circuit, motor control circuit, sequential process control design, Programmable Logic Control and manufacturing control system.

### **REFERENCES:**

1. Jon Stenerson, Industrial Automation and Process Control, Upper Saddle River, NJ: Prentice Hall, 2003.
2. Mikell P. Groover, Automation, Production Systems, and Computer Integrated Manufacturing, 3<sup>rd</sup> Edition, Upper Saddle River, NJ: Prentice-Hall, 2007.
3. W. Bolton, An Introduction: Programmable Logic Controller, 3<sup>rd</sup> Edition, Oxford Newnes, 2003.
4. John R. Hackworth, Frederick D. Hackworth, PLC: Programming Methods and Application, Pearson Education, 2004.
5. Frank D. Petruzella, Programmable logic controllers, 3<sup>rd</sup> Edition, McGraw Hill, 2005.

YEAR 2

SEMESTER 2

**UWA10302 ISLAMIC 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.

**REFERENCES:**

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*.
4. Mahyuddin Hj. Yahaya, (1998). *Tamadun Islam*, Shah Alam: Penerbit Fajar Bakti Sdn. Bhd.
5. Iddaikkadar. N.M. (1979). *Latar Belakang Kebudayaan Hindu*. Kuala Lumpur: Dewan Bahasa dan Pustaka.

**BWM30602 ENGINEERING MATHEMATICS IV**

**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 by Taylor Series, Euler, Huen, Runge-Kutta methods. Solution of Boundary-Value Problems by finite difference method. Partial Differentiation Equations: Explicit and implicit method using finite difference method. Finite-element Method: Finite-element application in one dimension heat flow.

REFERENCES:

1. Nafisah Md Kamaruddin, *et. al.* 2008. *Numerical Method*.
2. D. V. Griffiths, I. M. Smith. 2006. *Numerical methods for engineers*, 2<sup>th</sup> Edition. Boca Raton, FL: Chapman & Hall.
3. J. N. Sharma. 2004. *Numerical methods for engineers and scientists*, Pangbourne: Alpha Science International.
4. Jaan Kiusalaas. 2005. *Numerical methods in engineering with MATLAB*, Cambridge: Cambridge University Press.
5. John H. Mathews, Kurtis D. Fink. 2004. *Numerical methods using MATLAB*, 4<sup>th</sup> Edition. US Upper Saddle River, NJ: Pearson Education.

**BPK30902                      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.

REFERENCES:

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*, 13<sup>th</sup> Edition, Prentice Hall Inc.
4. Chan S. Park, (2007). *Contemporary Engineering Economics*, 4<sup>th</sup> Edition, Pearson International Edition.

**BEB20303                      ELECTROMAGNETIC FIELDS AND WAVES**

**SYNOPSIS:**

Explanation on electromagnet; Explanation on vector analysis, Electromagnetism, Electrostatic; Charge, Charge density, Coulomb's Law, Flux density, Potential difference, Gauss's law, Electrical energy, Capacitance, Magnetostatic, Biot-Savart's law, Ampere's Circuit law, Magnetic force, Magnetic material, Magnetic circuit, Induction, Transformer, Time-Varying fields; Faraday's law, Lenz's law, Maxwell equations, Electromagnetic wave equations: Polarization, Acceleration, Frequency, Power, Wave reflection at normal incidence plane and oblique plane.

**REFERENCES:**

1. Matthew M.O.Sadiku, Element of Electromagnetic, 4<sup>th</sup> Edition, Oxford University Press, 2001 (Repr. 2003).
2. Fawwaz T. Ulaby, Fundamentals of Applied Electromagnetics, Prentice Hall, 2004.
3. Fawwaz T. Ulaby, Electromagnetics for Engineers, Pearson Education, 2005.
4. William H. H, Engineering Electromagnetics, McGraw-Hill, NY, 2005.
5. Edward J. Rothwell and Michael J. Cloud, Electromagnetics, CRC Press, 2001.

**BEC20202                      MULTIMEDIA TECHNOLOGY AND APPLICATION**

**SYNOPSIS:**

This course is intended to provide a study of multimedia technology and application theory, practice and issues through the use of a multimedia application development and authoring tools. Topic covered; Introduction to Multimedia, Multimedia Application Development and Authoring, Multimedia Elements, Multimedia I/O Technology, Multimedia Storage and Retrieval Technology.

**REFERENCES:**

1. Syed Mahbubur Rahman, "Multimedia technologies: concepts, methodologies, tools and applications", London: Information Science Reference, 2008.
2. Ze-Nian Li, Mark S. Drew, "Fundamentals of Multimedia", Int. Edition. Pearson Prentice-Hall, 2004.
3. Nigel Chapman and Jenny Chapman, Digital Multimedia, Wiley, 2000.
4. Prabhat K. Andleigh, Multimedia Systems Design, Prentice hall 1995.
5. Jeffcoate, Multimedia in Practice – Technology and Applications, Prentice Hall, 1994.

**BEH 20403                    INSTRUMENTATION AND MEASUREMENT**

**SYNOPSIS:**

This subject is mainly about work principles of various measuring instruments, method of measuring and important aspects in measurement. Initially, the students will be introduced to electrical measurement and instrumentation, meter for DC and AC, bridges and also measurement procedures. Next, the students will be exposed to measurement of high voltage and current for AC and DC, and also power measurement in AC and DC. Basic principle of digital meter, analog to digital converter, single-slope and dual-slope converter, voltage to frequency converter and counter are covered for digital instruments, with addition of digital oscilloscope, its operation and waveform analysis. Types of sensors and transducers, their characteristics and applications are introduced in the final chapter.

**REFERENCES:**

1. R.S. Figliola and D.E. Beasley, Theory and Design for Mechanical Measurements, John Wiley and Sons, Inc., 2006.
2. Ponniran, B.S. Kader Ibrahim, M.S. Kamarudin and S.A Zulkifli, Electrical and Electronic Instruments and Measurements, Penerbit KUiTTTHO, 2006.
3. J.P. Bentley, Principles of Measurement System, 4<sup>th</sup> Edition, Pearson Prentice Hall, 2005.
4. R.J. Tocci, N.S. Widmer and G.L. Moss, Digital Systems: Principles and Applications, 9<sup>th</sup> Edition, Prentice Hall, 2004.
5. Rizzoni G., Principles and Applications of Electrical Engineering, 4<sup>th</sup> Edition, McGraw Hill, 2003.

**BEH 20501                    MECHATRONIC ENGINEERING LABORATORY II**

**SYNOPSIS:**

This course comprises of practical implementation for the subject of Power System, and Instrumentation and Measurement. Various experiments are covered such as generator and transformer, overhead line, short circuits asymmetrical analysis, protection system, power factor correction, error in measurement, basic usage of oscilloscope, sinusoidal waveform, measuring phase and frequency using oscilloscope, application of digital oscilloscope, signal generator and frequency counter three-phase inverter.

YEAR 3



YEAR 3

SEMESTER 1

**UWB10802            FRENCH LANGUAGE**

**SYNOPSIS:**

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

**REFERENCES:**

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.

**UWB10902            GERMAN LANGUAGE**

**SYNOPSIS:**

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

**REFERENCES:**

1. Nur Zakiah binti Amir Hamzah, (2010). *Guten Tag !*, Pejabat Penerbit UTHM.
2. Angela Wilkes. (2006). *GERMAN FOR BEGINNERS*, London: Usborne Publishing Ltd.
3. Aufderstrasse. (1998). *Themen Neu 1*, Lehrwerk fuer Deutsch als Fremdsprache.

4. Dr. Albert H. Small. (1991). German à la Cartoon. German Grammar through Cartoons.
5. Oxford University Press (2006). First Edition 2006- Oxford Beginner's German Dictionary.

## **UWB11002                    JAPANESE LANGUAGE**

### **SYNOPSIS:**

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

### **REFERENCES:**

1. Surie Network, (1998): *Minna no Nihongo* – Main text book, First Publish. 3A Corporation Tokyo.
2. Surie, Network (2000): *Minna no Nihongo – Hyōjunmondaishyū*, First Publish. 3A Corporation Tokyo.
3. Surie Network, (2009): *Minna no Nihongo* – Translation and Grammatical Notes in English (Asian Edition), Eighth Edition. 3A Corporation Tokyo.
4. The AOTS, (1977): *Shin Nihongo no Kiso* – Japanese Kana Workbook, First Publish: 3A Corporation Tokyo.

## **UWB11102                    MANDARIN LANGUAGE**

### **SYNOPSIS:**

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

### **REFERENCES:**

1. 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. Dr.Lim Choon Bee. (2005). Universiti Putra Malaysia Press. Serdang.
5. Hui Jin Chang. (2002). United Publishing House (M) Sdn.Bhd. K.L.

**UWB11202            BAHASA MELAYU**

**SYNOPSIS:**

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

**REFERENCES:**

6. Asmah Hj. Omar. (2005). Susur Galur Bahasa Melayu. DBP : KL
7. Asmah Hj. Omar. (2003). Nahu Melayu Mutakhir. DBP : KL
8. Abdul Hamid Mahmood. (1992). Menguasai Ejaan Bahasa Malaysia Dengan Cepat. DBP: KL
9. Abdul Hamid Mahmood. (1998). Menguasai Ejaan Bahasa Melayu. DBP : KL
10. Edward S. King. (1998). Speak In Malay. Times Publication : KL

**UWB11302            SPANISH LANGUAGE**

**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.

**REFERENCES:**

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.

**UWB11402                    ARABIC LANGUAGE**

**SYNOPSIS:**

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

**REFERENCES:**

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-Saudiah: Idarah al-Kutub al-Madrasiyyah, Wizarah al-Taalim.

**BEE 31202                    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.

**REFERENCES:**

1. Bernacki, E. (2002). *Wow! That's a Great Idea!*. Prentice Hall, Singapore.
2. De Bono, E. (2003). *Serious Creativity 1: Lateral Thinking Tools, Techniques and Application*. Allscript Books, Singapore.
3. De Bono, E. (2003). *Serious Creativity 2: Lateral Thinking Tools, Techniques and Application*. Allscript Books, Singapore.

4. Ceserani, J. & Greatwood, P. (1995). *Innovation and Creativity*. Kogan Page, London.
5. Ceserani, J. & Greatwood, P. (2001). *Innovation and Creativity*. Creast Publishing House, New Delhi.

## **BWM 20502            ENGINEERING STATISTICS**

### **SYNOPSIS:**

Random Variables : Discrete and continuous random variables, probability distribution functions, cumulative distribution functions, expected values and variance. Special Probability Distributions : Binomial distribution, Poisson distribution, means and variances, Poisson approximation to Binomial distribution, normal distribution, standard normal distribution, normal approximation to Binomial distribution. Sampling Distribution : Sampling distribution of single mean, sampling distribution of the difference between two means, sampling distribution test:  $t$ , chi-square and  $F$  distribution. Estimation : Point estimate, confidence interval for single mean, difference between two means, single variance and ratio of two variances. Hypothesis Test : Type 1 and type 2 errors, hypothesis test for single mean, difference between two means, single variance and ratio of two variances. Simple Linear Regression : Graphical method, simple linear regression model, least square method, hypothesis testing for intercept and slope, coefficient of determination, correlation coefficient.

### **REFERENCES:**

1. Norziha Che Him et al. First Edition. *Engineering Statistics (BSM 2922)* Pusat Pengajian Sains, UTHM 2009.
2. Nafisah @ Kamariah et. al. Second Edition. *Engineering Statistics*. Pusat Pengajian Sains, KUiTTTHO. 2004.
3. Quek Suan Goen, Leng Ka Man & Yong Ping Kiang. *Mathematics STPM*. Federal Publications, Selangor. 2004.
4. John E. Freund. *Mathematical Statistics*. Sixth Edition. Prentice-Hall, New Jersey. 1999.
5. Robert D. Mason. *Statistics : An Introduction*. Sounders College Publisher, Texas. 1994.

**BEB 31803                      ELECTRONIC COMMUNICATION SYSTEMS**

**SYNOPSIS:**

This course introduces the fundamentals in analog and digital communication systems. Comprises of analysis of signals and noise, generation of analog and digital modulation schemes, transmission lines, antenna and wave propagation as a part of a complete system in communication. Finally, the topic discussed relate with current application in communication systems.

**REFERENCES:**

1. Wayne Tomasi, Electronic Communication Systems: Fundamental Through Advanced 5<sup>th</sup> Ed., Pearson Prentice Hall, 2004.
2. Jeffrey S. Beasley, Gary M. Miller, Modern Electronic Communication 9<sup>th</sup> Ed., Pearson Prentice Hall 2008.
3. Proakis, J. G., Salehi M., Communication System Engineering 2<sup>nd</sup> Ed, Pearson Prentice-Hall, 2002.
4. Couch, L. W., Digital and Analog Communication Systems, 7th Ed, Pearson Prentice-Hall, 2007.
5. Proakis, J. G. et al, Essential of Communication System Engineering, Pearson Prentice-Hall, 2005

**BEL 30403                      ELECTRONIC CIRCUIT ANALYSIS AND DESIGN**

**SYNOPSIS:**

Fundamental concepts of analog electronics and the application of these concepts to the design of analog circuits. Among the topics covered are the fundamentals of operational amplifiers: linear and non-linear operation; feedback and oscillators; op-amp circuits: Instrumentation amplifier, active filters; regulated DC power supply. Focus is on the design, implementation, and testing of analog circuits by means of computer simulation software.

**REFERENCES:**

1. R.Boylestad, L. Nashelsky;Electronic Devices and Circuit Theory, 9th Edition; Prentice Hall; 2006.
2. Donald A. Neamen; Microelectronics Circuit Analysis and Design, 3<sup>rd</sup> Ed.; McGraw Hill, 2007.
3. Adel S. Sedra and Kenneth C. Smith; Microelectronics Circuits, 5<sup>th</sup> Ed.; Oxford Univ. Press, 2004.
4. Thomas L. Floyd; Electronic Devices, 7<sup>th</sup> Ed. ; Prentice Hall, 2005.

**BEH 30702                    MECHATRONIC ENGINEERING LABORATORY III**

**SYNOPSIS:**

This laboratory give students hands-on experience in understanding the material presented in the following subjects:

- BEP30403 Communication Theory
- BEL30403 Electronic Circuit Analysis & Designs

**REFERENCES:**

1. Jeffrey S. Beasley, Gary M. Miller, Modern Electronic Communication, 9<sup>th</sup> Ed, Pearson Prentice Hall, 2008.
2. Wayne Tomasi, Electronic Communication Systems: Fundamental Through Advanced 5<sup>th</sup> Ed., Pearson Prentice Hall, 2004.
3. Couch, L. W., Digital and Analog Communication Systems, 7th Ed, Pearson Prentice-Hall, 2007.
4. Proakis, J. G.et al, Essential of Communication System Engineering, Pearson Prentice-Hall, 2005.
5. Ziemer, R. E., et. al., Principles of Communciation, 5th Ed, John Wiley, 2002.

**BEH 30603                    CONTROL SYSTEM THEORY**

**SYNOPSIS**

This subject is about the analysis and design of control systems. The subject is organized in six chapters. Chapter 1 presents an introduction to control systems. Chapter 2 provides introduction to Laplace transforms, transfer function, and mathematical modeling of dynamic systems (mechanical, electrical, and electronic system). Chapter 3 presents time domain analysis of control systems. Chapter 4 treats root locus method to analyze control systems. Chapter 5 presents basic materials on frequency domain analysis of control systems. Finally, Chapter 6 deals with the introduction to control system design including the design of PID controllers and compensators.

**REFERENCES:**

1. Nise, N. S., Control Systems Engineering, 4<sup>th</sup> Edition, John Wiley, 2004.
2. Dorf, R. C., Bishop R. H., Modern Control Systems, 10<sup>th</sup> Edition, Prentice Hall, 2005

3. Kuo, B. C., Golnaraghi, F., Automatic Control System, 8<sup>th</sup> Edition, John Wiley, 2003
4. M. Gopal, Control Systems: Principle and Design, 2<sup>nd</sup> Edition, McGraw Hill, 2002
5. K. Ogata, Modern Control Engineering, 4<sup>th</sup> Edition, Prentice Hall, 2002.

YEAR 3

SEMESTER 2

**BEE 30103                      ENGINEERING MANAGEMENT**

SYNOPSIS

This course introduces engineers to the ways in which management principles are applied in engineering project and organization. Managing people and career opportunities as engineering manager. Management function: planning and forecasting, strategy formulation, decision making, organizing, leading and controlling. Quality Management. Project management and its activities. Resources Management, Financial Management, and Maintenance, Reliability and Safety Management are among the topics covered.

REFERENCES:

1. Lucy C. Morse and Daniel L Babcock, Managing Engineering and Technology. Prentice Hall, 2007.
2. C. M. Chang, Engineering Management : Challenges in the New Millennium, Prentice Hall, 2005
3. Avraham Shtub, Jonathan F. Bard, Shlomo Globerson, Project Management : Processes, Methodologies and Economics, Prentice Hall, 2005
4. John V. Chelsom, Andrew C. Payne, Management for Engineers, Scientists and Technologists, John Wiley, 2004
5. Abdul Talib Bon, Pengurusan Kejuruteraan, Penerbit KUiTTHO, 2004.

**BEB 30503                      DIGITAL SIGNAL PROCESSING**

SYNOPSIS

This subject is to introduce and understand the main concepts of digital signal processing, review of discrete signal and system, characteristic and operation, discrete convolution, digital filter design, sampling and quantization, discrete Fourier transform,



z-transform, IIR and FIR digital filters, the implementation of digital filters, random process, spectrum estimation and DSP processor.

REFERENCES:

1. Digital Signal Processing: Principles, Algorithm and Applications, John G. Proakis, Dimitris G Manolakis, 4<sup>th</sup> Ed, Pearson Prentice Hall, 2007.
2. Analog and Digital Signal Processing, Ashok Ambardar, 2<sup>nd</sup> Edition, Thompson, 1999

BEC 30303                    COMPUTER ARCHITECTURE AND ORGANISATION

SYNOPSIS

The course is about the fundamentals of computer organization and architecture and relates these to contemporary design issues. The application of these concepts depends on the current state of the technology and the price/performance objectives of the designer. This syllabus is organized into eight chapters. The structure and functional of computer are covered in chapter 1 and chapter 2. The performance issues are also discussed in chapter 2. Chapter 3 through chapter 6 covered the major components of the computer systems. Architectural issue such as instruction sets design and data types are covered in chapter 7. Finally, organizational issues such as pipelining also covered in chapter 8.

REFERENCES:

1. Andrew S. Tanenbaum. Structured Computer Organization, 5<sup>th</sup> Edition. Pearson Prentice Hall-New Jersey. 2006.
2. Murdocca, Miles J; Heuring, Vincent P. Principles of Computer Architecture, International Edition. Prentice Hall-New Jersey. 2000.
3. William Stallings. Computer Organization & Architecture: Designing for Performance, 7<sup>th</sup> Edition. Pearson Prentice Hall-New Jersey. 2006.
4. Hamacher, Carl; Vranesic, Zvonko; Zaky, Safwat. Computer Organization, 5<sup>th</sup> Edition. McGraw-Hill-Singapore. 2002.
5. Williams, Rob. Computer Systems Architecture: A Networking Approach, Pearson Education-England. 2001.

BEC 30403            MICROPROCESSOR AND MICROCONTROLLER

SYNOPSIS

This course is intended to provide a study of the concept of microprocessor and microcontroller with an emphasis on programming skills; design, interfacing between microprocessor/ microcontroller and other device, CPU architecture, organize and memory interfacing, bus concept, interrupt, communication interfacing and A/D conversion.

REFERENCES:

1. Barry B. Brey, "INTEL Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium ProProcessor, Pentium II, III, 4, 7/E", Prentice Hall, 2005.
2. Mazidi, "PIC Microcontroller & Embedded Systems", Pearson, 2008.
3. A.V Deshmukh, "Microcontrollers: Theory and Applications", McGrawHill, 2006.
4. Dogan Ibrahim, "PIC Basic: Programming and Projects", Oxford: Newnes, 2001.
5. Martin Bates, "Introduction to Microelectronic Systems: The PIC16F84 Microcontroller", London: Arnold, 2000.

BEH 30902            MECHATRONIC ENGINEERING LABORATORY IV

SYNOPSIS

To give students hands-on experience in understanding the material presented in the following subjects:

- BLL3133 Computer Architecture and Organization
- BLC3223 Microprocessor and Microcontroller

BEH 31001            MECHATRONIC DESIGN SOFTWARE

SYNOPSIS

This subject is the laboratory works for Computer Aided Engineering (CAE). The laboratory works comprise 12 (twelve) experiments covering 6 (four) topics i.e.: introduction to Computer Aided Engineering (CAE) (2 experiments), Computer Aided Draughting And Design (CADD) (2 experiments), Numerical Methods (2 experiments),

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Computer Aided Manufacture (CAM) (2 experiments), Computer Aided Production Planning (CAPP) and control (2 experiments), and System Simulation (2 experiments).

REFERENCES:

1. Chapra S. C., Applied Numerical Methods with MATLAB for Engineers and Scientists, 2<sup>nd</sup> Edition, McGraw-Hill, 2008.
2. Butt R., Introduction to Numerical Analysis Using MATLAB, Infinity, 2008
3. Raphael, B., Smith, I.F.C, Fundamentals of Computer Aided Engineering, Willey, 2003.
4. Karam F., Kleismit C., Using CATIA V5, Thomson Learning, 2004.
5. Alfred Yarwood, An introduction to AutoCAD 2004: 2D and 3D design, Elsevier Science, 2004.

YEAR 3

SEMESTER 3

BEE 30304            INDUSTRIAL TRAINING (8 WEEKS)

SYNOPSIS

Students are required to undergo industrial training in related field for 8 weeks in the organizations determined by faculty and assessed by both their external and internal supervisors.

REFERENCES:

1. Buku Log Latihan Industri UTHM. (Bahagian A), Pejabat Penerbit UTHM

YEAR 4

YEAR 4

SEMESTER 1

BEE 40602            FINAL YEAR PROJECT I

SYNOPSIS:

This course is the first part of an individual project during final year of study based on a topic selected from the subjects studied or a related engineering problem. Each student is expected to present his proposal and research plus a progress report during the first seminar of the final year project.

REFERENCES:

1. Guidelines for the Implementation of Final Year Project in the Faculty of Electrical and Electronics Engineering UTHM.
2. Guidelines for Thesis Writing.

BEH 41103            MECHATRONIC MECHANISM

SYNOPSIS:

This subject is about the analysis and application of mechanism and machine system. The subject is organized in 7 (seven) chapters. The outline of the subject is as follows: Chapter 1 presents gear systems. Chapter 2 deals with power transmission (belting). Chapter 3 discusses balance of machine system. Chapter 4 presents friction in screws and nut. Chapter 5 gives introduction to mechanism. Chapter 6 explains the actuator and power system. Finally, Chapter 7 discusses vibration system. These essential topics in machining might provide students with proficient theoretical and graphical background in dealing with machine systems.

REFERENCES:

1. B.K. Sarkar, Theory of Machines, Tata Mc-Graw Hill, 2002.
2. Roslan, Che' Abas and Mohd Yunus, Mekanik Mesin, Edisi Ketiga, Unit Penerbitan UTM, 2001.
3. John J.U, Gordon R.P and Joseph E.S, Theory of Machines and Mechanism, Oxford University N.Y., 2003.
4. Theory and Problems of Machine Design, Schaum's Outline Series, 1983.
5. J.S. Hannah and R.C. Stephens, Mechanics of Machines, Unwin Brothers Ltd., 1972.

BEH 41202            MOTION CONTROLS

SYNOPSIS:

This subject contains fundamental of motion control systems and their applications, motors for motion control system, control of dc motors, control of stepper motor, and programmable motion control (PMC) systems.

REFERENCES:

1. De Silva, C. W., Mechatronics: An Integrated Approach, CRC Press, 2005.
2. Cetinkunt, S., Mechatronics, John Wiley & Sons Inc., 2007.
3. Braga, N. C., Robotics, Mechatronics, and Artificial Intelligence, Newnes, 2002.
4. Onwubolu, G. C., Mechatronics: Principles and Applications, Elsevier, 2005.
5. Histan, M. B., Alciatore, D. G., Introduction to Mechatronics and Measurement Systems, McGraw-Hill, 1999.

BEH 41303            MANUFACTURING PROCESS

SYNOPSIS:

This subject covered both fundamentals and principles of manufacturing process. The fundamentals of manufacturing process were catered from Topic 1 to Topic 4 beginning from Introduction of Manufacturing in Topic 1, Manufacturing in Topic 2, Manufacturing Component Geometry Distribution in Topic 3 and Design Material and Manufacturing in Topic 4. The remaining topics discussed the principles of manufacturing process such Casting Process in Topic 5, Plastic Forming Process in Topic 6, Forming Process in Topic 7, Material Removal Process in Topic 8, Joining Process in Topic 9 and finally Measurement and Quality Assurance in Topic 10.

REFERENCES:

1. W. K. Wake, Design Paradigms – A Sourcebook for Creative Visualization, John Wiley & Son Inc., New York, First Edition, 2000.
2. H. Petroski, Design Paradigms – Case Histories of Error and Judgement in Engineering, Cambridge University Press, 6th Edition, 1998.
3. P. Stensel, A. Tung, S. B. Seng, Design and Technology, Longman, 2000.
4. J. A. Philips, Pengajaran Kemahiran Berfikir – Teori Dan Amalan, Utusan Publication & Distributors Sdn Bhd., Kuala Lumpur, Third edition, 1999.
5. G. E. Dieter, Engineering Design, Mc Graw Hill, London, Third edition, 2000.

BEH 41401            MECHATRONIC ENGINEERING LABORATORY V

SYNOPSIS:

This lab session is a practical and hands-on experience from subject Mechatronic Mechanism and Manufacturing Process learnt theoretically. 10 experiments were selected beginning with Rigid Body Equilibrium in Experiment 1, Conveyor Drive in Experiment 2 and Gear Bevel in Experiment 3, covering Mechatronic Mechanism subject. The remaining experiments were allocated for Manufacturing Process subject with Conventional Machining Process in Experiment 4, CNC Machining Process in Experiment 5, Advanced Machining Process in Experiment 6, Welding Process in Experiment 7, Casting Process in Experiment 8, Plastic Injection Process in Experiment 9 and finally Manufacturing System in Experiment 10.

REFERENCES:

1. W. K. Wake, Design Paradigms – A Sourcebook for Creative Visualization, John Wiley & Son Inc., New York, First Edition, 2000.
2. H. Petroski, Design Paradigms – Case Histories of Error and Judgment in Engineering, Cambridge University Press, 6th edition, 1998.
3. P. Stensel, A. Tung, S. B. Seng, Design and Technology, Longman, 2000.
4. M P. Groover, Modern Manufacturing Technology, John Wiley and Son, 2002.
5. S. Kalpakjian and R. Scmidth, Manufacturing Engineering Technology, Prentice Hall, 2001.

BEH 41503            DIGITAL CONTROL SYSTEMS

SYNOPSIS:

This subject is about introduction to digital control system, domain-z analysis, design digital control use root locus, frequency response, state space method and pole-placement design method.

REFERENCES:

1. Franklin and Powell J, Digital Control of Dynamic Systems, 3<sup>rd</sup> Edition, Addison Wesley, 1998.
2. Phillips and Nagle, Digital Control System Analysis and Design, Prentice Hall, 1998.
3. Ogata K., Discrete-Time Control Systems, Prentice Hall, 1995.

4. Franklin and Powell, Feedback Control of Dynamic Systems, International Edition, 2002.
5. Kuo, Digital Control Systems, Oxford University Press, USA, 1991

YEAR 4

SEMESTER 2

BEE40704 FINAL YEAR PROJECT II

SYNOPSIS:

This course is the second part of an individual project during final year of study based on a topic selected from the subjects studied or a related engineering problem. Each student is expected to present result of his final year project.

REFERENCES:

1. Guidelines for the Implementation of Final Year Project in the Faculty of Electrical and Electronics Engineering UTHM.
2. Guidelines for Thesis Writing.

BEH 41603 MECHATRONIC SYSTEM DESIGN

SYNOPSIS:

This subject is about the design of mechatronics systems. The subject is organized into 2 (two) main sections. The outline of the subject is as follows: Section 1 is the overview of mechatronics that presents the introduction to mechatronics, mechatronics integration, and overview of design process. Section 2 is a case study of line follower mobile robot. This section as an example of mechatronics system that describes the detail of design process start by identifying system requirement, then providing the mechanical, electrical/electronics, and software design. This section is ended by giving the system testing and analysis for this kind mobile robot application.



REFERENCES:

1. W. Bolton, Mechatronics, 3<sup>rd</sup> Edition, Pearson, 2003.
2. Sabri Cetinkunt, Mechatronics, John Wiley & Sons, 2007.
3. David G. Alciatore and Michael B. Hirst, Introduction to Mechatronics and Measurement Systems 3<sup>rd</sup> Edition, McGraw Hill, 2007.
4. Karl T. Ulrich and Steven D. Eppinger Product Design and Development 4<sup>th</sup> Edition, McGraw Hill, 2008.
5. Roland Siegwart and Illah R. Nourbakhsh, Introduction to Autonomous Mobile Robots, The MIT Press, 2004.

BEH 41703            ROBOTIC SYSTEMS

SYNOPSIS:

This subject is about learning the basic concept of robotic systems and their classifications. It also involves the concept of forward kinematics, inverse kinematics, motion kinematics, dynamics, path planning and control systems of robotics. The operational principles and usage of drive system and sensors in the robotic systems. The technique of basic robot programming and trajectory planning. Also covers mobile robot, micro robot and nano robot.

REFERENCES:

1. Martin, F. G., Robotic Explorations, Prentice Hall, 2001.
2. Keramas, J. G., Robot Technology Fundamentals, Delmar Thompson Publishers, 1999.
3. Shimon Y Nof, Handbook of Industrial Robotics, 2<sup>nd</sup> Edition, New York: John Wiley, 1999
4. Geoff Williams, CNC Robotics : Build Your Own Workshop Bot, New York: McGraw Hill, 2003.
5. Jorge Angeles, Fundamentals of Robotic Mechanical Systems : Theory, Methods and Algorithms ,2<sup>nd</sup> Edition, London: Springer, 2002

BEH 41803            INTELLIGENT CONTROL SYSTEMS

SYNOPSIS:

This subject provides the students the knowledges of fuzzy logic controller, history of fuzzy logic, important applications of fuzzy logic, its structures and operations as well as fuzzy logic parameters. The contents of the subject are also providing the knowledges of neural networks, basic components, basic ideas and group pattern as well as relationships between fuzzy logic controller and neural networks.

REFERENCES:

1. T. J. Ross, Fuzzy Logic with Engineering Application 2<sup>nd</sup> Edition, John Wiley & Sons Ltd, 2004.
2. Satish Kumar, Neural Networks, A Classroom Approach, McGraw Hill, 2005.
3. Leonid Reznik, Fuzzy Controllers, Newnes-Butterworth-Heinemann, 1997.
4. Callan, R., The Essence of Neural Networks, Prentice Hall, 1999.
5. J. Ross, Fuzzy Logic and Control, Software and Hardware Application; Mohammad Jamshidi, Nader Vadiiee, Timothy PTR Prentice Hall; 1993.

BEH 41902            VISION SYSTEMS

SYNOPSIS:

This course covers theoretical foundations of computer vision. By formulating computer vision as a statistical inference process, computational approaches to vision are presented and analyzed systematically. Chapter 1 presents introduction to computer vision. Chapter 2 and 3 provides introduction to cameras and its parameters. Chapter 4 presents about segmentation process. Chapter 5 covers about noise removal techniques. Chapter 6 elaborate about image features. Chapter 7 discuss about various method for object recognition. Finally, Chapter 8 gives an overview about stereo vision system.

REFERENCES:

1. David A. Forsyth, Jean Ponce, Computer Vision: A Modern Approach, Prentice Hall, 2003.
2. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, 2<sup>nd</sup> Edition, Prentice Hall, 2002
3. K. P. Horn Berthold, Robot Vision, 12<sup>nd</sup> Edition, MIT Press, 1998
4. Olivier Faugeras, Three Dimensional Computer Vision, MIT Press, 1993
5. Emanuele Trucco, Alessandro Verri, Introductory Techniques for 3-D Computer Vision, Prentice Hall, 1998.