

BACHELOR IN ELECTRICAL ENGINEERING
Yellow Paper

**ELECTIVE COURSE
BACHELOR IN ELECTRICAL ENGINEERING WITH HONOURS**

Communication Engineering		
Code	Course	Credit
BEP 4113	Digital Communication	3
BEP 4213	Switching and Traffic Engineering	3
BEP 4223	Data Communication	3
BEP 4233	Mobile Radio Communication	3
BEP 4243	Satellite Communication System	3
BEP 4253	Optical Communication System	3
BEP 4263	RF and Microwave Engineering	3

Automation System and Robotic		
Code	Course	Credit
BER 4113	Digital Control	3
BER 4213	Flexible Automation System	3
BER 4223	MicrocontrollerApplication	3
BER 4233	Fuzzy Control System	3
BER 4243	Industrial Robotics	3
BER 4253	Industrial Control System	3

Electrical Power		
Code	Course	Credit
BEK 4113	Electrical Power Measurements and Testing	3
BEK 4213	Transmission and Distribution of Electrical Power System	3
BEK 4223	Power System Protection	3
BEK 4233	Electrical System Design	3
BEK 4243	Electrical Energy Generation	3
BEK 4263	Power Station Engineering	3
BEK 4253	High Voltage Engineering	3

Medical Electronic		
Code	Course	Credit
BEU 4113	Human Physiology	3
BEU 4213	Medical Instrumentation 1	3
BEU 4223	Medical Imaging	3
BEU 4233	Telemedicine	3
BEU 4243	Medical Instrumentation 2	3

Computer Engineering		
Code	Course	Credit
BEC 4113	Computer Architecture	3
BEC 4213	Microelectronic	3
BEC 4223	Computer Network	3
BEC 4233	Computer System Engineering	3
BEC 4243	Operating System	3
BEC 4253	Embedded System Design	3

Mechatronic		
Code	Course	Credit
BEM 4113	Digital Control	3
BEM 4213	Mechanism and Machine	3
BEM 4223	Intelligent Robot	3
BEM 4233	Neural Network and Fuzzy Logic	3
BEM 4243	Control Electronics	3
BEM 4253	Industrial Automation System	3

YEAR 1
Yellow Paper

**YEAR 1
SEMESTER I**

UMA 1162 ISLAMIC AND ASIAN CIVILISATION

SYNOPSIS :

The course discusses introduction to civilization, its development, interaction between civilization; the Islamic civilisation, Islam in the Malay civilisation; Indian and Chinese civilisations as well as contemporary civilisation 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. 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.
6. Iddaikkadar. N.M. 1979. *Latar Belakang Kebudayaan Hindu*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
7. Azhar Hj. Mad Aros. 2001, *Tamadun Islam dan Tamadun Asia*, Kuala Lumpur: Penerbit Universiti Malaya.
8. Ismail Hussein, Wan Hashim Wan Teh, Ghazali Shafie 1997, *Tamadun Melayu Menyongsong abad ke-21*, Bangi: Penerbit UKM.
9. Sarkar, H.B. 1970. *Some Contribution of India to the Ancient Civilization of Indonesia and Malaysia*. Calcutta: Punthi Pustaka.
10. Wan Abdullah Hj Ismail Mahmood (ed.), 1999, *Tamadun Islam & Tamadun Alam Melayu Serta Sumbangannya Kepada Dunia*, Unit Tamadun Islam, Pusat Pendidikan Islam, UiTM Shah Alam.
Nasr, S.H. *A Young Muslim's Guide to the Modern World*.

UMB 1011 ENGLISH FOR ACADEMIC PURPOSES

SYNOPSIS :

English for Academic Purpose devotes its contents to fulfilling student's academic requirements such as the acquisition of reading, note taking, library, writing as well as speaking and listening skills in English. Besides that students will also be trained to refine their skills in expository writing. Students will be exposed to insights and skills in English that are most relevant to them in their tertiary studies and academic work. Problem Based Learning (PBL) approach will also be integrated all though the teaching and learning of the course.

REFERENCES :

1. Lucas, S.E. (1995) *The Art of Public Speaking*, New York. McGraw-Hill Inc.
2. Pfeiffer, W.S. (2000) *Technical Writing: A Practical Approach*, New Jersey.
3. Samuels, M.S. (1989) *The Technical Writing Process*, New York. Oxford University Press.

UMB 1052 EFFECTIVE COMMUNICATION

SYNOPSIS :

This course focuses on developing students' delivery of speech in oral interactions and presentations confidently. Students will be guided from the preparatory stage right up to the final stage of delivery. Emphasis is given on mastery of using verbal and non-verbal skills as well as skills in using appropriate visual aids in oral presentations. Students will also be taught to anticipate and deal with questions and comments orally during a question and answer session. This course is also for students to acquire the knowledge and skills necessary for conducting and participating in meetings. It will also include writing of meeting documents.

REFERENCES :

1. Davies, J.W. 1996. *Communication for Engineering Students*. Essex : Longman
2. Ellis, R. 1997. *Communication for Engineers. Bridge that Gap*. New York : Arnold
3. Hybels, S. and Weaver, R.L. 1998. *Communicating Effectively*. Boston : McGraw Hill
4. Wiley, T.G. and Wrigley, H.S. 1987. *Communicating in the Real World*. Prentice-Hall

BSM 1913

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 $0/0$, ∞/∞ , $0 \cdot \infty$, 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.

REFERENCES :

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

UQ* 1**1

CO-CURRICULUM I

SYNOPSIS:

This subject is offered in different activity options for Diploma and under-graduate students, namely Sports and Recreational, Club/Associations and Uniform Bodies.

BEE 1113 ELECTRICAL CIRCUIT THEORY

SYNOPSIS :

This subject is about the concepts on the techniques for circuit analysis. There are seven chapters beginning with circuit elements and the supply sources in a circuit. In this part, student will learn about the basic part in electrical circuit theory including the basic components and the basic basic concept about voltage, power, energy, series and parallel circuits. Other than that, circuit analysis using mesh and nodal analysis and all the related law/theorems, first and second order circuit also covered in this subject. Finally, students also learn about the circuit simulation using any related simulation software.

REFERENCES:

1. Fundamentals of Electric Circuits 2nd Ed; Alexander, C. K.; Sadiku, M.N.O.; McGraw Hill International Editions; 2004.
2. Electric Circuits, 7th Ed ; James W. Nilsson and Susan A. Riedel ; Prentice-Hall; 2005
3. Basic Engineering Circuit Analysis, 7th Ed.; J. David Irwin; John Wiley & Sons; 2002.
4. Engineering Circuit Analysis, William H. Hayt, Jack E. Kemmerly, McGraw Hill, 2002
5. Introduction to Electric Circuits, 7th Edition, Richard C. Dorf & James A. Svoboda; John Wiley & Sons; 2005
6. Introduction to PSpice Manual Using OrCAD Release 9.2 to Accompany Electric Circuits, 7th Edition, James W. Nilsson and Susan A. Riedel, Prentice-Hall, 2005.

BDA 1602 MATERIAL SCIENCE

SYNOPSIS :

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

REFERENCES:

1. Callister, W.D. Jr, 2003, *“Materials Science and Engineering : An Introduction”*, 6th Edition, John Wiley
2. Smith, W.F., 1996, *“Principles Of Materials Science And Engineering”*, 3rd Edition, McGrawHill
3. Shackelford, J.F., 1999, *“Introduction To Materials Science For Engineers”*, 5th Edition, Prentice Hall
4. Schaffer, J.P., Saxena et al, 1999, *“The Science and Design of Engineering Materials”*, 2nd Edition, McGraw-Hill

BEE 1122 COMPUTER SOFTWARE AND NETWORK

SYNOPSIS :

This subject is about the introduction to the computer and information technology. It discuss about the computer software and hardware. Software application such as Operating System while hardware application such as Computer Processing Unit and Memory System. Besides, this subject also discuss about the communication through computer networking and internet including type of computer network, protocol applied and the software used.

REFERENCES:

1. Teknologi dan Sistem Maklumat, Fakulti Sains Komputer dan Sistem Maklumat, ACE, 2000.
2. Menguasai Internet, Dr. Ahmad Zaharim Abdul Aziz, Pustaka Cipta Sdn Bhd, 2000.
3. Schaum's Outline of Computer Architecture, Nicholas Carter, McGraw-Hill, 2002.
4. Understanding the Network: A Practical Guide to Internetworking, Michael J. Martin, New Riders, 2000.
5. Computer Architecture and Organization: Design Principles and Applications, B. Govindarajalu, McGraw-Hill, 2004.
6. Computer Networking and the Internet, H. Fred, 5th ed, Pearson Education, 2005
7. Computer Networking First-step, O. Wendell, Cisco Press, 2004

**YEAR 1
SEMESTER II**

UMS 1122 ETHNIC RELATION

SYNOPSIS :

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

REFERENCES:

1. 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. 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.
6. Ruslan Zainudin, Mohd Mahadee Ismail dan Zaini Othman (2005). "Kenegaraan Malaysia." Shah Alam: Fajar Bakti.
7. Ting Chew Peh (1980). "Konsep Asas Sosiologi." Kuala Lumpur : Dewan Bahasa dan Pustaka.

UMB 1042 TECHNICAL WRITING

**PRASYARAT : UMB 1052 (EFFECTIVE
COMMUNICATION)**

SYNOPSIS :

This course introduces students to report writing skills needed at tertiary level. Students will learn basic report writing skills involving 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. Davies, J.W. (1996). *Communication for Engineering Students*. Essex : Longman
2. Ellis, R. (1997). *Communication for Engineers*. Bridge that Gap. New York : Arnold
3. Hybels, S. and Weaver, R.L. (1998). *Communicating Effectively*. Boston : McGraw Hill
4. Wiley, T.G. and Wrigley, H.S. 1987. *Communicating in the Real World*. Prentice-Hall

BSM 1933 ENGINEERING MATHEMATICS II

PREREQUISITE BSM1913 ENGINEERING MATHEMATICS I

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 2π . 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.

BEE 1212 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 Principal, programming language basics, data types, input and output operations, the use of arrays, string, pointers and structures, file processing handling and advance applications.

REFERENCES:

Main Reference :

1. Problem Solving and Program Design in C, 4th. Edition. Jeri R. Hanly, Elliot B. Koffman, Addison-Wesley, 2004.

Other References :

1. C Programming for Engineers, 2nd Edition. Edition. Jeri R. Hanly, Elliot B. Koffman, Addison-Wesley, 2004.
2. C: How to Program, 4th Edition, H. M. Deitel and P. J. Deitel, Prentice-Hall, 2004

3. Structured C for Engineering and Technology, 4th Edition, James L. Antonakos and Kenneth C. Mansfield, Prentice-Hall, 2001.
4. Interfacing with C, 1st Edition, Hutchings et al, Butterworth-Heinemann, 2000.
5. Problem Solving Using C : Structured Programming Techniques, 2nd Edition, Yuksel Uckan. Mcgraw-Hill, 1998.
6. Struktur Data Menggunakan C, Marini Abu Bakar *et al.*, Prentice Hall, 1999.

BEE 1223 ELECTRIC TECHNOLOGY

PREREQUISITE BEE 1113 (ELECTRIC CIRCUIT THEORY)

SYNOPSIS :

This subject is about concept of sinus, phasor, ac circuit, relationships phasor for circuit impedance and admittance, impedance combination, sinusoidal steady-state analysis, nodal analysis, mesh analysis, Superposition Theorem, Thevenin and Norton equivalent circuits, ac power analysis, instantaneous power, average power, apparent power, power factor, complex power, balanced three-phase voltage, balanced wye-wye connection, balanced wye- delta connection, balanced delta-delta connection, balanced delta-wye connection, power in a balanced system, construction and types of transformer, ideal transformer, autotransformer, three phase transformer, principles of DC machines, Single Phase AC Motor, and Synchronous Machines

REFERENCES:

1. Fundamentals of Electric Circuits; Charles K. Alexander, Matthew N.O. Sadiku, Mc Graw-Hill; 2002
2. Principles and Applications of Electrical Engineering; Rizzoni, Giorgio, Mc Graw-Hill; 2003
3. Electric Circuit, Sixth Edition; James W.Nisson, Susan A.Riedel, Pearson Prentice Hall, 2001
4. Electrical Engineering Principles and Applications ,Third Edition; Allan R.Hambley, Pearson Prentice Hall, 2005
5. HUGHES Electrical and Electronic Technology, Ninth Edition; Edward Hughes, 2005

BDA 1612 THERMODYNAMICS

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.

REFERENCES :

1. J.R. Howel, R. O Buckins; *Fundamental of Engineering Thermodynamics*; McGraw Hill
2. D.R. Spalding and E.H. Cole;*Engineering Thermodynamics* ; Edward Arnold 3rd Edition ; 1978

3. G.F.C. Rogers and Y.R. Meyhew ; *Engineering Thermodynamics: Work and Heat Transfer* ; Longman
4. Yunus A. Cengel, Micheal A. Boles: *Thermodynamics: an Engineering Approach, 2nd Edition*, Mc Grew hill, 1994

BEE 1231 ELECTRICAL ENGINEERING PRACTICES

PREREQUISITE : BEE 1223 (ELECTRICAL TECHNOLOGYK)

SYNOPSIS:

The subject 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.

REFERENCES:

1. Hj. Md. Nasir Hj Abd Manan, Panduan Pendawaian Elektrik Dometik, I.E.E Edisi 16, BS7671:1992 Pindaan 2, 1997, 2004.
2. Bill Atkuison, Electrical Installation Designs, 3rd Edition, Blackwell Pub., 2002.
3. Ray C. Mullin, Electrical Wiring – Residential: Delmar Publisher Inc, 2002.
4. Geoffrey Stokes, A Practical Guide to the Wiring Regulations, BS 7671, Oxford: Blackwell Scientific, 2002.
5. Roger L. Brauer, Hoboken, Safety and Health for Engineers, NJ: John Wiley, 2006.
6. E. G. Patterson, Lighting Systems, London: Thomson Learning, 2001.
7. Brian Scaddan, IEE Wiring Regulations Explained and Illustrated, Oxford: Newnes, 2001.
8. Brian Scaddan, IEE Wiring Regulations: Design and Verification of Electrical Installations, Oxford: Newnes, 2002.
9. Robert D. L. Smith & Stephen L. Herman, Electrical Wiring Industrial, Australia: Thomson Learning, 2002.
10. Keith Pethebridge & Ian Neeson, Electrical Wiring Practice, Beijing: McGraw-Hill, 2002.

YEAR 2
Yellow Paper

**YEAR 2
SEMESTER I**

UMA 1132 ISLAMIC STUDIES

SYNOPSIS :

This course explains about Islamic concepts which cover aqidah, syariah and akhlak. The scope of the discussion involves the Islamic principles, iman's principles and Ihsan. Focus will also be given on the basic of Islam that emphasizes on the concept of tauhid, ibadah and akhlak. This course also clarifies about the foundation of Islam (*maqasid al syariah*), current issues and the interrelation with akhlak.

REFERENCES :

1. Abdul Rahman I.Doi, (1995), *Undang-undang Syariah, terjemahan*, Rohani Abdul Rahim, Kuala Lumpur m: Dewan Bahasa dan Pustaka
2. Harun Din, (Dr.), (2001), *Manusia dan Islam*, Kuala Lumpur, Dewan Bahasa dan Pustaka
3. Mohd. Sulaiman Haji Yasin, (1988), *Pengantar Aqidah*, Kuala Lumpur : Dewan Bahasa dan Pustaka.
4. Mustafa Hj. Daun, (1996), *Tamadun Islam*, Kuala Lumpur : Utusan Publications dan Distribution
5. Wahbah al-Zuhaily, (Dr.), (1984), *Fiqh al-Islami wa Adillatuhu*, Damsyik : Dar al-Fikr
6. Yusuf al-Qardawi, (1993), *Ibadah Dalam Islam*, Kuala Lumpur : Pustaka Suhaba

UMA 1142 MORAL STUDIES

SYNOPSIS :

This subject explores the 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.

UMC 1022 CREATIVITY AND INNOVATION

SYNOPSIS :

This course focuses on developing creative individuals who will eventually think strategically, creatively and critically. Through Problem Base Learning (PBL) approach, student will be exposed to various creativity and problem solving techniques. The knowledge and skills acquired throughout the course will later be applied by the students in solving problems and making decisions in the future. Some of the areas covered throughout the course are: Thinking Skills; Problem Solving Skills; Techniques in Creativity; Techniques in Innovation; Seminar and Case Studies.

REFERENCES :

1. Bono, Edward De. 1998. *Edward De Bono Supermind Pack: Expand Your Thinking Power With Strategic & Mental Exercise*. DK Publishing Incorporated.

BSM 2913 ENGINEERING MATHEMATICS III

PREREQUISITE : BSM 1913 ENGINEERING MATHEMATICS I

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 (7th Edition). New York:
3. John Wiley.Straud, K.A. (1996). Further Engineering Mathematics (3rd Edition). England: Macmillian Publication
4. Robert T. Smith, and Roland B. Minton (2007). Calculus Early Transcendental Function (3rd Edition). New York: McGraw-Hill.
5. James Stewart (2003). Calculus. USA. Thomson Learning Inc.

UM* 1312 FOREIGN LANGUAGE

- **UMF 1312 FRENCH LANGUAGE**

SYNOPSIS:

This course is offered to students focusing on the learning of the basic of French. Students are exposed to the skills of listening, reading, speaking and writing with basic vocabulary, grammar and structure. Students are also provided with a lot of opportunities to practice their communication and writing skills.

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.

OTHER REFERENCES

- 1 Capelle, Guy et Gidon, Noëlle, 1995. Méthod de français: Le Nouvel Espaces 1. Paris: HACHETTE F.L.E..
- 2 Hatier. 2002. Le Nouveau Bescherelle 12,000 French Verbs. English Edition. Paris: Librairie Hatier.
- 3 Das, Theresa & Yam-Ramanantsoa, Hanta. 1992. Bienvenue Chez Nous. Kuala Lumpur: L'Ambassad de France et DBP.
- 4 DBP, USM & Kedutaan Besar Perancis, 1996. Kamus Perancis Melayu Dewan. Kuala Lumpur: DBP
- 5 French Dictionary 1999. The New Collins Robert 5th Edition. Paris: Harper Collins Publishers.

• **UMG 1312** **GERMAN LANGUAGE**

SYNOPSIS:

This course is designed for students to learn the basic of 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, Guten Tag der deutschen sprache, 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, Textbook. Muenchen: Max Hueber Verlag.
- (4) Dr. Albert H. Small. 1991. *German â la Cartoon*. German Grammar through Cartoons. Passports Books

• **UMJ 1312** **JAPANESE LANGUAGE**

SYNOPSIS:

This course is designed for students to learn basic Japanese language such as speaking, listening, reading, and writing. Students will be exposed to the real daily conversations which will enable them to communicate in basic Japanese language.

REFERENCES:

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*
6. *Modul Pengajaran Bahasa Jepun Tahap 1 (2008)* Penerbit UTHM
7. *The AOTS Nihongo Dictionary for Practical Use (2005)* 3A Corporation, Japan
8. *Informative Japanese Dictionary (2005)* Shinchousha Corporation, Japan

• **UMM 1312** **MANDARIN LANGUAGE**

SYNOPSIS :

This course is offered to students focusing on the learning of 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 provided with a lot of opportunities to practice their communication and writing skills.

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. Yeoh Sim Joo, 1995. Malaya Books Suppliers Co. Sdn. Bhd., K.L.

• **UMP 1312** **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. Fernández, Nieves Garcia and Jesús Sánchez. 1995 : *Español 2000. Nivel Elemental*. Decimosexta edicion. SGEL educacion, España
2. Salina Husain, 2005: *Vamos A Apender Español Lengua Extranjera. Nivel Elemental*. KUiTTTHO. Batu Pahat, Johor
3. B. Godev : *Mas alla de las palabras ; a complete program in intermediate Spanish/Olga Gallego, Consepcion*
4. John Wiley, 2004 : *Avanzado: gramatica Española y lectura/ Sara L. De la Vega, Carmen Salazar*. Hoboken, NJ

• **UMR 1312** **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. Abdul Hamid Redwan. T.th. *Kursus Bahasa Arab*. Singapura; Speedy Self Study System
2. Ahmad Hassan. 1995. *Nahu Bahasa Arab*: Pustaka Aman Press
3. Ahmad Hassan. 1995. *Pelajaran Bahasa Arab Untuk Orang Bukan Arab*. Kota Bharu. Pustaka Aman Press
4. Hashim Hanafiah. 1981. *Al-Lughah al-Arabiyyah*. Kuala Lumpur; Percetakan Watan

BEE 2113 ELECTRONIC PRINCIPLES

PREREQUISITE : BEE 1113 (ELECTRIC CIRCUIT THEORY)

SYNOPSIS :

This subject deals with the analysis and design of circuits containing diodes and transistor. Semiconductor theory : energy band models, electron and hole concentration and transport, p-n junction ; Diodes : characteristics, load line analysis, diode circuits, applications of diodes in rectifier circuits, clipping and clamping circuits, zener diode, special purpose diodes ; Bipolar junction transistor ; construction and operations, applications as switch and amplifier, characteristics and biasing, small signal analysis, amplifier parameters ; frequency response : BJT and JFET ; Compound configurations : multistage amplifiers, cascade and cascode configurations, Darlington pair, Differential amplifier.

REFERENCES :

1. *Electronic Devices and Circuits*; Micheal Hassul, Don Zimmerman; Prentice Hall; 1997
2. *Introductory Electronics Devices and Circuits, Conventional Flow Version, 4th Edition*; Robert T. Paynter; Prentice Hall; 1997
3. *Electronic Devices and Circuit Theory, 8th Edition*; R. Boylestad, L. Nashelsky; Prentice Hall; 2002
4. *Principles of Electronics Devices*; W.D. Stanley; Prentice Hall; 1995

BEE 2123 ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

PREREQUISITE BEE 1223 (ELECTRICAL TECHNOLOGY)

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, analog 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. *Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting*; R. G. Gupta, McGraw Hill, 2001.
2. *Pengukuran dan Instrumentasi Elektrik*; Ruzairi Hj. Abul Rahim, Herlina Abdul Rahim, Nasarudin Ahmad, Anita Ahmad; Penerbit UTM, 2003.
3. *Instrumentasi*; Mohd Fua'ad Rahmat, Sallehuddin Ibrahim; Penerbit UTM, 2003.
4. *Digital Systems: Principles and Applications, 9th Ed.*; Ronald J. Tocci, Neal S. Widmer and Gregory L. Moss, Prentice Hall, 2004.
5. *Principles and Applications of Electrical Engineering, 4th Ed.*; Rizzoni G.; McGraw-Hill, 2003.

6. Theory and Design for Mechanical Measurements; Richard S. Figliola and Donald E. Beasley; John Wiley and Sons, Inc., 2006.
7. Fundamentals of Electric Circuits, 2nd Ed.; Alexander C. K. & Sadiku M. N. O., McGraw-Hill, 2000.
8. Electronic Instrumentation and Measurements; David A. Bell; Prentice Hall Career and Technology, 1994.
9. Electronic Instrumentation and Measurements; Larry D. Jones, A. Foster Chin; Prentice Hall International Edition, 1995.

BEE 2191 ELECTRICAL ENGINEERING LABORATORY I

SYNOPSIS :

This subject is arranged to give the students approaches regarding the laboratory works in the subjects of electronics principle (BEE 2113) and electrical instruments and measurements (BEE2123). All experiments will be conducted at Instrumentation Laboratory and Basic Electronics Laboratory.

REFERENCES:

1. Electronic Instrumentation and Measurements; David A. Bell; Prentice Hall Career and Technology, 1994.
2. Pengukuran dan Instrumentasi Elektrik; Ruzairi Hj. Abul Rahim, Herlina Abdul Rahim, Nasarudin Ahmad, Anita Ahmad; UTM Publisher , 2003.
3. Electronic Instrumentation and Measurements; Larry D. Jones, A. Foster Chin; Prentice Hall International Edition, 1995.
4. Process Control Instrumentation Technology; Curtis D. Johnson; Prentice Hall, 2003.
5. Instrumentasi; Mohd Fua'ad Rahmat, Sallehuddin Ibrahim; UTM Publisher, 2003.
6. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting; R. G. Gupta, McGraw Hill, 2001.

**TAHUN 2
SEMESTER II**

UMS 1113 NATIONHOOD AND CURRENT DEVELOPMENT OF MALAYSIA

SYNOPSIS :

This course will provide students a fundamental concept, process of formation and development in 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 constitutional of Malaysia, Malaysian Government System, Economic and Social Development Policy as a main policy in national development. At the end of the course students will be able to appreciate their roles and responsibilities as good citizens to the country.

REFERENCES :

1. Abu 'Urwah.1990. *Konsep-konsep Umum Islam*. Kuala Lumpur : Pustaka Salam.
2. Ahmad Esa,Khairul Azman HMS dll.2000. *Ikhtisar Sejarah Pembangunan Sosio- Politik dan Ekonomi Malaysia 1*. Johor Bharu.
3. Ahmad Esa,Khairul Azman HMS dll.2000. *Ikhtisar Sejarah Pembangunan Sosio-Politik dan Ekonomi Malaysia 2*. Johor Bharu
4. Aziz Deraman.1992. *Tamadun Melayu dan Pembinaan Bangsa Malaysia*. Kuala Lumpur: Arena Ilmu.

BSM 2922 ENGINEERING STATISTIC

PREREQUISITE : BSM 1913 ENGINEERING MATHEMATIC I

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.

BEE 2213 ELECTROMAGNETIC FIELDS AND WAVES

PRE-REQUISITE: BSM 2913 (ENGINEERING MATHEMATICS III)

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, 4th 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.
6. Zoya Popovic and Branko D. Popovic, Introductory Electromagnetics, Prentice Hall, New Jersey, 1999.

BEE 2273 ELECTRONIC DEVICES AND APPLICATIONS

PREREQUISITE : BEE 2113 (ELECTRONIC PRINCIPLES)

SYNOPSIS :

This subject deals with the analysis and design of electronic circuits involving the applications of electronic devices.

Operational amplifiers : characteristics, applications : inverting amplifier, non-inverting amplifier, summing amplifier, differentiator, voltage comparator, schmitt trigger; Practical op-amp circuits : Instrumentation amplifier, active filters; Feedback : types, characteristics and effect of negative feedback, negative feedback amplifier, Positive feedback and oscillator operation; Oscillator : sinusoidal signal generator, op-amp signal generator; Oscillator circuits – phase shift, crystal, unijunction, IC waveform generator; Timer : 555 timer – table and monostable, timer circuits; DC power supply : Characteristics, diode rectifier circuits, Filters – Capacitive and Inductive Filtering, Voltage Regulators : zener diode, series and shunt transistor and op-amp regulators, short circuit protection, IC regulator, Switching Regulator; Power amplifier : Class A, B, AB, C and D MOSFET power amplifier, Heat Stability and Compensation Techniques, Applivation of heat sinking and Protection Techniques;

REFERENCES :

1. *Electronic Devices and Circuits*; Micheal Hassul, Don Zimmerman; Prentice Hall; 1997.
2. *Introductory Electronics Devices and Circuits, Conventional Flow Version, 4th Edition*; Robert T. Paynter; Prentice Hall; 1997.
3. *Electronic Devices and Circuit Theory, 8th Edition*; R. Boylestad, L. Nashelsky; Prentice Hall; 2002.
4. *Principles of Electronics Devices*; W.D. Stanley; Prentice Hall; 1995.

BEE 2233

DIGITAL ELECTRONICS

SYNOPSIS:

This subject 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 Fundamentals, 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, 2nd 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.

BEE 2291

ELECTRONIC ENGINEERING LABORATORY II

**PREREQUISITE : BEE 2273 (PERANTI ELEKTRONIK DAN APLIKASI)
BEE 2233 (ELEKTRONIK DIGIT)**

SYNOPSIS:

This subject comprises of practical implementation for the subject of Power System, and Instrumentation and Control System. Various experiments under this subject will covers 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, position control system, speed control system and servo system.

REFERENCES:

1. Theodore Wilde, Electrical Machines, Drives and Power System; Pearson Educational International, 2006.
2. Nise, N. S., Control Systems Engineering 4th Edition; John Wiley, 2004.
3. Hadi Saadat, Power System Analysis; Prentice-Hall, 2004.
4. C.D. Johnson, Process Control Instrumentation Technology, 7th Ed.; Prentice Hall, 2003.
5. E. Acha, V. G Agelidis, O. Anaya-Lara, T. J. E Millwer, Control in Electrical System;, Newnes, 2002.
6. Dorf, R. C., Bishop R. H., Modern Control Systems 10th Edition; Prentice Hall, 2005.
7. Ogata, K., Modern Control Engineering 4th Edition; Prentice Hall, 2002.

YEAR 3
Yellow Paper

**YEAR 3
SEMESTER I**

UQ* 11 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.

BSM 3913 ENGINEERING MATHEMATICS IV

PREREQUISITE : BSM 1913 (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 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) D. V. Griffiths, I. M. Smith. 2006. *Numerical methods for engineers*, 2th Edition. Boca Raton, FL: Chapman & Hall.
- (2) J. N. Sharma. 2004. *Numerical methods for engineers and scientists*, Pangbourne: Alpha Science International.
- (3) Jaan Kiusalaas. 2005. *Numerical methods in engineering with MATLAB*, Cambridge: Cambridge University Press.
- (4) John H. Mathews, Kurtis D. Fink. 2004. *Numerical methods using MATLAB*, 4th Edition. US Upper Saddle River, NJ: Pearson Education.
- (5) Laurene Fausett. 2002. *Numerical methods using mathCAD*, Upper Saddle River, New Jersey.
- (6) Steven C. Chapra, Raymond P. Canale. 2002. *Numerical methods for engineers: with software and programming applications*, 4th Edition. Boston: McGraw-Hill

BEE 3113 ELECTRICAL NETWORKS ANALYSIS AND SYNTHESIS

PREREQUISITE : BEE 2273 (ELECTRONIC DEVICES AND APPLICATIONS)

SYNOPSIS :

These subjects include topics such as Laplace transform in circuit analysis, transfer function, the circuit response, stability, pole-zero, frequency response, a series of Salon, Salon line, Bode plot, two port networks: Z, Y, H and T, synthesis of active and passive filters; Butterworth filter, Chebyshev 's, Sallen-Key, use the method of Fourier series,

REFERENCES :

1. *Fundamentals of Electric Circuit*, Charles K. Alexander, McGraw-Hill, 2004
2. *Engineering Circuit Analysis*, William H. Hayt, McGraw-Hill 2002
3. *The Analysis and Design of Linear Circuits*, Thomas and Rosa, Prentice Hall, 2006

BEE 3123 COMMUNICATION ENGINEERING

SYNOPSIS :

The contents of this subject is about communication system with emphasizing in analog communication system. In this subject students will be exposed to the amplitude, frequency and phase modulation, demodulation, noise analysis, transmission line, antenna and wave propagation. At the end of syllabus, basic modulation in digital communication system will be introduced.

REFERENCES :

1. *Electronic Communication Systems Fundamentals Through Advance 5th Ed.*, Wayne Tomasi, Prentice Hall, 2004
2. *Electronic Communication Systems A Complete Course 4th Ed.*, William Schweber, Prentice Hall, 2002
3. *Communication Electronics Principles and Applications*, Louis E. Frenzel, 3rd Ed., McGraw-Hill, 2001
4. *Digital and Analog Communication Systems 6th Ed.*, Leon W. Couch, Prentice Hall, 2001

BEE 3133 DIGITAL SYSTEM DESIGN

PREREQUISITE : BEE 2273 (ELECTRONIC DEVICES AND APPLICATIONS)

SYNOPSIS :

Konsep Rekabentuk. Pengenalan kepada Rekabentuk Logik. Teknologi Pelaksanaan. Pelaksanaan optimum Fungsi-fungsi Logik. Litar Aritmetik. Blok-Blok Pembinaan Litar Gabungan. Flip-flop, Daftar serta Pemproses Mudah. Litar jujukan Segera. Litar jujukan Tak-Segera. Rekabentuk Sistem Digit. Pengujian Litar Logik.

REFERENCES :

1. *Digital Fundamentals with VHDL*, Floyd, Prentice Hall, 2003
2. *Rapid Prototyping of Digital Systems*, Hamblen, 2nd Ed. Kluwer, 2001
3. *Fundamentals of Digital Logic with VHDL Design*, Stephen Brown, McGraw Hill International Editions, 2000
4. *Digital Systems Design and Prototyping*, Salcic, Zoran, 2nd Ed. Kluwer, 2000

BEE 3143 CONTROL SYSTEM

SYNOPSIS :

Pengenalan kepada sistem kawalan iaitu sistem kawalan gelung buka dan gelung tutup. Suapbalik dan kesannya, jenis-jenis sistem kawalan suap balik, mekanisme-servo, pengaturan, kawalan proses, kawalan berjujukan. Permodelan matematik elemen mekanikal dan elemen elektrik. Pemodelan sistem kawalan kelajuan dan kedudukan. Analisis domain masa. Pengenalan kepada kaedah londar punca. Analisis kestabilan menggunakan kriteria kestabilan Routh-Hurwitz. Analisis domain frekuensi merangkumi plot Bode, Nyquist Kestabilan, jidar gandaan dan jidar fasa. Rekabentuk sistem kriterium menggunakan kaedah londar punca dan sambutan frekuensi.

REFERENCES :

1. *Modern Control Engineering*, Ogata, K. 4th Ed. Prentice Hall, 2002
2. *Automatic Control System*, Kuo, B., Golnaraghi. 8th Edition, John Wiley, 2003
3. *Modern Control Systems*, Dorf, R. C., Bishop R, 9th Ed. Prentice Hall, 2001
4. *Control Systems Engineering*, Norman, N. S., 3rd Ed., Benjamin/Cummings 2000

BEE 3191 ELECTRONICS ENGINEERING LABORATORY III

PREREQUISITE : **BEE 3123 COMMUNICATION ENGINEERING**
 BEE 3133 DIGITAL SYSTEM DESIGN
 BEE 3143 CONTROL SYSTEM

SYNOPSIS :

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

BEE 3123 Communication Engineering

BEE 3133 Digital System Design

BEE 3143 Control System

REFERENCES:

1. Jeffrey S. Beasley, Gary M. Miller, Modern Electronic Communication, 9th Ed, Pearson Prentice Hall, 2008.
2. Wayne Tomasi, Electronic Communication Systems: Fundamental Through Advanced 5th 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.
6. Simon Haykin, Communication System, 4th Ed, John Wiley and Sons, 2001.
7. Louis Frenzel, Communication Electronics, McGraw-Hill, 2001.

**YEAR 3
SEMESTER II**

BPK 3013 EKONOMI KEJURUTERAAN DAN KEUSAHAWANAN

SYNOPSIS :

Pengenalan Kepada Ekonomi Kejuruteraan; Nilai Semasa dan Kadar Faedah; Pengenalan Kepada Bajet Permodalan; Pengurusan Aset Tetap dan Susut Nilai; Pengenalan Kepada Keusahawan; Kaedah Mengenal Pasti, Mengkaji Dan Memilih Peluang Perniagaan; Rancangan Perniagaan.

REFERENCES :

1. *Engineering Economy*, Blank, L.T. dan Tarquin, A.J, 3rd Edition, McGraw-Hill, 1994
2. *Ready Made Activities For Financial Skill*, Derrick Fellows, Institute of Management Pitman, 1994
3. *Essence of Management Accounting*, Wesley Chadwick , Prentice Hall, 1991
4. *Mastering Finance and Accounting*, David Farrow, McGraw Hill, London, 1994

BEE 3213 DIGITAL SIGNAL PROCESSING

PREREQUISITE : BEE 3113 (ANALYSIS AND SYNTHESIS OF ELECTRICAL NETWORK)

SYNOPSIS :

The content of the course covers introduction and understanding of 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 : A Practical Approach*; Emmanuel C. Ifeachor, Barrie W., 2nd Ed, Addison Wesley, 2002
2. *Digital Signal Processing: A Computer Based Approach*, Sanjit K. Mitra, 3rd Ed, McGraw Hill, 2006
3. *Analog and Digital Signal Processing*, Ashok Ambardar, 2nd Ed, Brooks/Cole, 1999
4. *Discrete-Time Signal Processing*, Alan V. Oppenheim, Ronald W. Schaffer, 2nd Ed, Prentice Hall, 1999

BEE 3223 APPLIED ELECTROMAGNETICS

**PREREQUISITE : BEE 2263
(ELECTROMAGNETIC FIELDS AND WAVE)**

SYNOPSIS :

The content of the course covers transmission line : basic characteristics, characteristic impedance, standing wave ratio, load matching, Smith Chart. Waveguide : propagation in waveguide, attenuation, waveguide component. Antenna : Radiation pattern, isotropic radiator, gain, effective aperture. Radio propagation : fraunhofer region, fresnel zone, ionospheric propagation, tropospheric propagation, fading. EMC

REFERENCES :

1. Element of Electromagnetic, Matthew M.O.Sadiku, 2nd Edition, Oxford University Press, 2001
2. *Fundamentals of Applied Electromagnetics*, Fawwaz T.Ulaby, Prentice Hall, 2001
3. *Antennas For All Application*, 3rd Ed., J.D. Kraus, R.J Marhefka, McGraw-Hill, 2002
4. *Electromagnetic Theory and Wave Propagation*, 2nd Ed.S.N. Ghosh, , Alpha Science International Ltd, 2002

BEE 3233 MICROCONTROLLER AND MICROPROCESSOR

SYNOPSIS :

Senibina mikropemproses; Fungsi asas mikropemproses: masukan, keluaran sesiri, pemasa, sampukan, perolehan isyarat menggunakan A/D; Kemahiran pengaturcaraan mikropemproses: aritmetik binari, penggunaan kod ASCII; Pengaturcaraan bahasa penghimpun; Pengenalan kepada mikropengawal; Senibina mikropengawal; Sistem pembangunan dan sokongan mikropemproses (MPLAB); Pengaturcaraan PIC dalam bahasa penghimpun; Antaramuka PIC: Pengkalan masukan/keluaran (I/O), pemasa, sampukan, penukaran A/D, PWM, perhubungan sesiri.

REFERENCES :

1. *The 68000 Microprocessor: Hardware & Software Principles and Application*, 5th Edition, Antonakos, Prentice-Hall, 2001
2. *Programming and Customizing PIC Microcontrollers*, Mike Predko, McGrawHill 2000
3. *Microprocessor System Design 68000 Hardware, Software & Interfacing*, Clements, 3rd Edition, PWS, 1999
4. *Design with PIC Microcontrollers*, J. Peatman, Prentice-Hall, 1998

BEE 3243 ELECTRICAL POWER SYSTEM

PREREQUISITE : BEE 3123 (TEKNOLOGI ELEKTRIK)

SYNOPSIS :

Memahami kepentingan tenaga dan sistem kuasa. Komponen sistem kuasa. Prinsip penjanaan, penghantaran dan pengagihan kuasa. Jenis penebat, pengagihan deretan voltan dan keberkesanan. Talian atas dan sistem bawah tanah, jenis kabel. Simetri tiga-fasa. Pengujian Sistem Kuasa. Peralatan suis. Sistem perlindungan bagi penjana, transformer, palang bus dan talian penghantaran. Kegagalan sistem kuasa.

REFERENCES :

1. *Power Plant Engineering*; 2nd Edition, PKNag, McGraw Hill, 2002
2. *Introduction to Element Power System Technology* , Theodore R.Bosela, Prentice Hall, 1997
3. *Power System, Analysis and Design*, JDuncan Glover, Mulukutla, S.Sarma, Books/Core, 2002
4. *Electric Machines and Power Systems*; Syed A. Nasar, McGraw-Hill; 1995

BEE 3291 ELECTRONIC ENGINEERING LABORATORY IV

**PREREQUISITE BEE 3223 (APPLIED ELEKTROMAGNETIC)
 BEE 3233 (MICROPROCESSOR AND MICROCONTROLLER)
 BEE 3243 (ELECTRICAL POWER SYSTEM)**

SYNOPSIS :

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

BEE 3223 Applied Elektromagnetic
BEE 3233 Microprocessor And Microcontroller
BEE 3243 Electrical Power System

YEAR 4
Yellow Paper

**YEAR 4
SEMESTER I**

BPK 4023 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:

Main Reference:

1. Lucy C. Morse and Daniel L Babcock, Managing Engineering and Technology. Prentice Hall, 2007

Other References:

1. C. M. Chang, Engineering Management : Challenges in the New Millennium, Prentice Hall, 2005
2. Avraham Shtub, Jonathan F. Bard, Shlomo Globerson, Project Management : Processes, Methodologies and Economics, Prentice Hall, 2005
3. John V. Chelsom, Andrew C. Payne, Management for Engineers, Scientists and Technologists, John Wiley, 2004
4. Abdul Talib Bon, Pengurusan Kejuruteraan, Penerbit KUiTTHO, 2004.
5. David L. Goetsch, Occupational Safety and Health for Technologists, Engineers and Managers, 5th ed. Prentice Hall, 2005
6. Occupational Safety and Health Act 1994

BEE 4113 POWER ELECTRONIC

PREREQUISITE BEE 2223 (ELECTRONIC DEVICES AND APPLICATIONS)

SYNOPSIS :

This subject discuss about the types of solid state switching components, the working of various types of converter circuits and the associated control circuits. It also touches on the principles of AC and DC motor speed control. The use of solid state components in handling high voltage DC is also dealt with. Lastly the applications of switching devices and examples in industry are being discussed.

REFERENCES

1. Power Electronics Devices, Circuits, and Industrial Applications, V.R. Moorthi, Oxford University Press, 2005
2. Power Electronic Control in Electrical System, E. Acha, V.G. Agelidis, O. Anaya Lara, T.J.E Miller, Newnes, 2002.
3. Power electronics : converters, applications and design / Ned Mohan, William P. Robbins, Tore M. Undeland, John Wiley, 2003
4. Power electronics : circuits, devices, and applications / Muhammad H. Rashid, Prentice Hall, 2004
5. Electric Machines, Drives and Power Systems, 5th Edition, Theodeo Wildi, Prentice Hall, 2002.

BEE 4123 ELECTRIC MACHINES AND DEVICES

PREREQUISITE BEE 3243 (ELECTRIC POWER SYSTEM)

SYNOPSIS :

This subject is arranged to give the students about the approaches on the energy conversion devices, namely electric machines and its drives as well. Generally, electric machine has two main functions, i.e. as generator and motor. Among the contents of the syllabus are fundamentals of mechanical and electromagnetic, three-phase circuit, three-phase transformer, synchronous machine, AC and DC motors, and specialty motors.

REFERENCES :

1. Electric Machinery and Power System Fundamentals; Chapman Stephen J., McGraw-Hill, 2002.
2. Electrical Machines, Drives and Power Systems; Theodore Wildi, Prentice Hall, 2006.
3. Electrical Machines – Theory, Operation, Applications, Adjustment, and Control (2nd. Edition); Charles I. Hubert, Prentice Hall, 2002.
4. Electric Machines – Analysis and Design Applying Matlab; Jimmie J. Cathey, McGraw-Hill, 2001.

BEE 4191 ELECTRICAL ENGINEERING LABORATORY V

**PREREQUISITE BEE 4113 (POWER ELECTRONICS)
BEE 4123 (ELECTRIC MACHINES AND DRIVES)**

SYNOPSIS :

This subject is arranged to give the students approaches regarding the laboratory works in electric machines, its control system, and the applications of power electronics. Among the contents of the syllabus are the methods of handling and techniques of analysing the synchronous machine, induction motor, DC motor, and reluctance motor. The applications of power electronics such as in the inversion circuits and switch mode power supply are also included in this syllabus.

REFERENCES:

1. Electrical Machines, Drives and Power Systems; Theodore Wildi, Prentice Hall, 2006
2. Electric Machinery and Power System Fundamentals; Chapman Stephen J., McGraw-Hill, 2002.
3. Electronic Machines, Drives and Power Systems, 5th Edition, Theodeo Wildi, Prentice Hall, 2002.
4. Power Electronic Control in Electrical System, E. Acha, V.G. Agelidis, O. Anaya-Lara, T.J.E Miller, Newnes, 2002.
5. Modern Power Electronics and AC Drives, Bimal K. Bose, Prentice Hall, 2001.

BE* 41*3

ELECTIVE I

• **BEP 4113 DIGITAL COMMUNICATION**

SYNOPSIS :

The content of the course covers introduction to digital communication, information and channel capacity, baseband modulation and transmission, baseband demodulation and detection, digital bandpass modulation, digital modulation multi-level, theoretical of coding and application, digital modulation techniques for multi-user, spread-spectrum signaling and synchronization.

REFERENCES :

1. *Digital Communications – Fundamentals and Applications*, 2nd Edition, B. Sklar, Prentice Hall, 2001
2. *Communication Systems*, 4th Ed., S. Haykin, , John Wiley, NY, 2001
3. *Digital Communications*, 4th Ed., J. G. Proakis, McGraw Hill, 2001
4. *Introduction to Digital Communications*, 2nd Ed., R. E. Ziemer & R. L. Peterson, Prentice Hall, 2001

• **BEM 4113 DIGITAL CONTROL**

SYNOPSIS :

Pengenalan kepada system kawalan digit – gambarajah blok, kawalan berkomputer, pengekod tokokan dan pengekod mutlak. Analisis domain -z, jelmaan – z, rangkap pindah, sambutan system gelong tertutup, analisis kestabilan, pemetaan di antara satah-s dan satah-z. Rebutuk menggunakan londar punca, sambutan frekuensi, mendapatkan sambutan rentak mati. Kawalan digit menggunakan kaedah keadaan ruang – penyelesaian persamaan keadaan, analisis ragaman, matriks mempenjuru, kebolehkawalan, kebolehcerahan, suapbalik pembolehubah keadaan, pembolehubah berbilang dan kawalan optimal.

REFERENCES :

1. *Digital Control of Dynamic Systems*, Franklin, G. F., Powell, J. D. and Workman, M., 3rd Edition, Addison-Wesley, 1998.
2. *Digital Control, A state- Space Approach*, Vaccaro, R. J., McGraw Hill, 1995
3. *Digital Control System Analysis and Design*, Phillips, C., and Nogle, T., Prentice Hall, 1995
4. *Continuous and Discrete Control Systems*, Dorsey, J. McGraw-Hill, 2002

• **BEK 4113** **PENGUKURAN DAN PENGUJIAN KUASA ELEKTRIK**

SYNOPSIS :

Mata pelajaran ini adalah pengenalan kepada pengujian peralatan elektrik. Pengujian voltan arus terus bagi peralatan elektrik. Pengujian voltan arus ulangalik bagi peralatan elektrik. Minyak penebat, bendalir, dan gas. Pengubah. Kabel dan aksesori. Suis gear, pemutus litar, dan geganti perlindungan voltan sederhana. Suis gear dan pemutus litar voltan rendah. Motor dan penjana. Pembumian sistem kuasa elektrik.

REFERENCES :

1. *Electrical Power Equipment Maintenance and Testing*, Gill, Paul, Marcel Dekker 1998
2. *Electrical Equipment Handbook; Troubleshooting and Maintenance*, Kiarneh, Philip, McGraw-Hill 2003
3. *Power System Commissioning and Maintenance Practice*, Harker, Keith, IEE 1998

• **BEU 4113** **HUMAN PHYSIOLOGY**

SYNOPSIS :

Cell physiology and its components : nerve cell and tissue at receptor organ ; sensory cell's function ; vision, hearing, olfaction, brain and autonomic system ; gland system. Metabolism and reproductive system. Digestive system and Gastrointestinal. Respiratory and delivery system ; heart mechanism, chest, blood delivery and gas exchange and air. Urea secretion.

REFERENCES :

1. *Human Physiology : From Cells to Systems*, Lauralee Sherwood, Pacific Grove, Calif.: Brooks/Cole, 2001
2. *Human physiology : The Mechanisms of Body Function*, Arthur J. Vander, James Sherman, Dorothy Luciano, Boston : McGraw-Hill, 2001
3. *Lecture Notes on Human Physiology*, 4th Edition, John J. Bray, Patricia A. Cragg, Anthony D. C, Macknight, Roland G., Mills Blackwell Science, 1999
4. *Fundamentals of Anatomy & Physiology*, 4th Edition, Frederic H. Martini, Prentice Hall, 1998

• **BEC 4113** **COMPUTER ARCHITECTURE**

SYNOPSIS :

The subject 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. While organizational issues such as pipelining also covered in chapter 8.

REFERENCES :

1. *Computer Organisations and Architecture: Designing for Performance*, William Stallings, 6th Edition, Prentice Hall, 2003
2. *Computer Organization* 5th Ed. Hamacher, Carl; Vranesic, Zvonko; Zaky, Safwaf, McGraw-Hill: Singapore, 2002
3. *Computer Systems: Architecture, Networks and Communications*, Sebastian Coope, Neil Willis and John Cowley, McGraw-Hill, 2002
4. *Advanced PC Architecture*, William Buchanan and Austin Wilson, Addison-Wesley, 2001

BER 4113 DIGITAL CONTROL

PREREQUISITE : BEE 4113 (CONTROL SYSTEM)

SYNOPSIS:

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

REFERENCES:

1. *Digital Control of Dynamic Systems*, Franklin and Powell, J, 3rd Edition, Addison-Wesley, 1998.
2. *Digital Control System Analysis and Design*, Phillips and Nagle, Prentice Hall, 1998.
3. *Discrete-Time Control Systems*, Ogata, K. Prentice-Hall, 1995
4. *Feedback Control of Dynamic Systems*, Franklin and Powell, International Ed., 2002.
5. *Digital Control Systems*, Kuo, Oxford University Press, USA, 1991.
6. *Digital Control Systems: Design, Identification and Implementation*, Landau and G. Zito, Springer Verlag, 2005.
7. *Digital Control*, Kohn, John Wiley & Sons Inc, 2006.
8. *Digital Control Systems*, Rabah A, Prentice Hall, 2004.
9. *Computer Controlled Systems*, Astrom and Wittenmark, Prentice-Hall, 3rd ed, 1998.

BEE 4192 FINAL YEAR PROJECT I

SYNOPSIS :

Each student is required to carry out an individual project during his final year of study based on a topic selected from the subjects studied or a related engineering problem. This project is divided into two parts. 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.

**YEAR 4
SEMESTER II**

BPE 4032 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. Vallerio, P. Aarne Vesilind, Socially Responsible Engineering : Justice in Risk Management, John Wiley, 2006

BEE 4213 UTILIZATION OF ELECTRICAL ENERGY

PREREQUISITE BEE 3243 (ELECTRICAL POWER SYSTEM)

SYNOPSIS :

This subject discuss about the electrical installation rules and regulations, the installation of electric switchgears, earthing, power factor improvement and tariffs. The importance of the usage of electrical energy in industry specifically in heating and drying, welding, electroplating and batteries charging shall be discussed. Apart from that an introduction on the causes, problems and solutions of electrical power system harmonics shall follow. The final part touches on electrical safety and the avoidance of electrical hazards.

REFERENCES (REFERENCES):

1. Industrial Power Engineering and Applications Handbook, Agrawal, K.C., Newnes, 2001.
2. Electrical Equipment Handbook; Troubleshooting and Maintenance, Kiarnah, Philip, McGraw-Hill 2003.
3. Practical power distribution for industry / Jan De Kock, Kobus Strauss, Newnes, 2004.
4. Electric power distribution / A. S. Pabla, Mc Graw Hill, 2005.

5. Distribution switchgear / Stan Stewart, IEE, 2004.
6. Electric power distribution handbook / T. A. Short, CRC Press, 2004.
7. Protection of electricity distribution networks / Juan M. Gers and Edward J. Holmes, IEE, 2004.

BE* 42*3 ELEKTIF 2
Sila Lihat Senarai Mata Pelajaran Elektif

BE* 42*3 ELEKTIF 3
Sila Lihat Senarai Mata Pelajaran Elektif

BEE 4294 FINAL YEAR PROJECT II

PREREQUISITE: PASSED BEE4192 FINAL YEAR PROJECT I

SYNOPSIS:

Each student is required to carry out an individual project during his final year of study based on a topic selected from the subjects studied or a related engineering problem. This project is divided into two parts. 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.

REFERENCES :

1. Panduan Pelaksanaan Projek Sarjana Muda Universiti
2. Buku Panduan Pelaksanaan Projek Sarjana Muda Fakulti

**YEAR 4
SEMESTER III**

BEE 4394 INDUSTRIAL TRAINING

SYNOPSIS

Students are required to undergo industrial training in related field for 12 weeks in the organizations determined by faculty. They will be assessed both by their external and internal supervisors. They will also undergo training provided by companies as long as it suits the industrial training scope for Bachelor Degree.

REFERENCES

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

ELECTIVES SUBJECT

Yellow Paper

ELECTIVES SUBJECT

- **COMMUNICATION ELECTRONICS**

BEP 4213 SWITCHING AND TRAFFIC ENGINEERING

PREREQUISITE : **BEE 3123 (COMMUNICATION ENGINEERING**
 BEP 4113 (DIGITAL COMMUNICATION)

SYNOPSIS :

The content of the course covers introduction and understanding of switching system and telecommunications traffic, analog telephone system, telephone cable system, voice, digital transmission. Multiplexer, traffic engineering, digital switching system, SPC, integrated services digital network (ISDN) and signaling system.

REFERENCES :

1. Telecommunication System Engineering, Roger Freeman, 4th edition, John Wiley, 2004
2. *Digital Telephony*, J. C. Bellamy, 3rd Ed, John Wiley, 2000
3. *Telecommunications Switching, Traffic and Networks*; J E Flood; Prentice Hall UK, 1999
4. Telecommunications Engineering, J. Dunlop and D. G. Smith, Chapman and Hall, 1997

BEP 4223 DATA COMMUNICATION

SYNOPSIS :

The content of the course covers introduction and understanding of data communication system, open system architecture, OSI basic data communication system, main network components, transmission system-weakness, error detection and correction, data compression, fundamental protocol, data link protocol, network layer, transport layer, LAN, MAN, and WAN, session layer, application and presentation layer and TCP/IP protocol.

REFERENCES :

1. *Understanding Data Communications and Networks*, William A. Shay, 3rd Edition, Brooks/Cole, 2004
2. *Data Communication and Networks : An Engineering Approach*, James Irvine and David Harle, John Wiley 2002
3. *Data and Computer Communications : Internet and Internetworking*, Gurdeep S Hura and Mukesh Singhal, CRC Press, 2001
4. *Data and Computer Communication*, William Stallings, 6th Edition, Prentice Hall, 2000.

BEP 4233 KOMUNIKASI RADIO BERGERAK

PREREQUISITE : **BEE 3123 (KEJURUTERAAN KOMUNIKASI), BEE 3223 (ELEKTROMAGNET GUNAAN), BEP 4113 (KOMUNIKASI DIGIT)**

SYNOPSIS :

Pengenalan kepada sistem komunikasi selular bergerak, konsep asas, kehilangan laluan, pembentukan denyut dan pengkodan talian, memahami kecekapan spektrum dalam sistem radio selular darat bergerak, teknik pemodulatan analog, teknik pemodulatan digital, teknik berbilang capaian.

REFERENCES :

1. *Wireless Communication: Principles and Practice*, 2nd Ed, T.S. Rappaport, Prentice Hall, 2002
2. *Cellular Mobile Radio System*, H Hamuda, John Wiley, 1997
3. *Introduction to Digital Mobile Communications*, Y Akaiwa, John Wiley, 1997
4. *GSM Cellular Radio*, J Tisal, John Wiley, 1997

BEP 4243 SATELLITE COMMUNICATION SYSTEM

PREREQUISITE : **BEE 2123 (ENGINEERING COMMUNICATION)
BEE 3223 (APPLIED ELECTROMAGNETIC)
BEP 4113 (DIGITAL COMMUNICATION)**

SYNOPSIS :

The content of the course covers Kpler's Law 1,2,3, Kpler Orbital elements, orbital perturbations, Julian calendar, GECS, THCS, Subsatellite point, predicting satellite position, Ionospheric depolarization, Troposphere, space link, rain attenuation, power budget, multiple access, interference between satellite circuits, TDMA, FDMA, CDMA.

REFERENCES :

1. *Satellite Communication System : Systems, Techniques and Technology*, G. Maral and M. Bousquet, 4rd Ed, John Wiley, 2002
2. *Satellite Communications*, Dennis Roddy, 3rd Ed., McGraw – Hill, 2001
3. *Satellite Communication Fundamentals*, Jules E. Kadish dan Thomas W. R. East, Artech House, 2000
4. *Satellite Communication Systems*, 2nd Ed., M. Richharia, McGraw-Hill, 1999

BEP 4253 OPTICAL COMMUNICATION SYSTEM

PREREQUISITE : BEE 3123 (ENGINEERING COMMUNICATION)
BEP 4113 (DIGITAL COMMUNICATION)

SYNOPSIS :

The content of the course covers review light propagation : space , wave packet ; optical cable and optical fibre : types, characteristics, usage losses, optical modulation, coupling light into fibre, fibre communication link ; optical source : LED, laser ; photodetector : Photodiode PIN, APD ; optical components : oscillator, isolator, connector, switch, coupler ; multichannel optical system : digital transmission, WDM, system design, noise and attenuator, SNR, BER, OTDR, OSA.

REFERENCES :

1. *Fiber-Optic Communication Systems*, 3rd Ed, Govind P. Agrawal , John Wiley & Sons, 2002
2. *Fiber-Optic Communications Technology*, Djafar K. Mynbaev dan Lowell L. Scheiner, Prentice Hall, 2001
3. *Optical Fiber Communications*, 3rd Ed, Gerd Keiser, McGraw-Hill, 2000
4. *Fiber Optic Communications*, 4th Ed, Joseph C. Palais, Prentice Hall, 1998

BEP 4263 RF AND MICROWAVE ENGINEERING

PREREQUISITE : BEE 3223 (APPLIED ELECTROMAGNETIC)

SYNOPSIS :

The content of the course covers microwave network analysis : one port and two port networks. Impedance, admittance and scattering matrix, signal flow graphs, microwave devices : Klystron, magnetron, TWT, diodes, transistors. Microwave measurement. Filter theory and design. Active microwave circuits. Oscillators and mixers. Transistor amplifier design. MIC, MMIC.

REFERENCES :

1. *Radio-Frequency and Microwave Communication Circuits*, Devendra K. Misra, John Wiley and Sons, 2001
2. *RF Circuit Design, (Theory and Applications)*, R. Ludwig and P. Bretchko, Prentice Hall, NJ, 2000
3. *Microwave Engineering*, Annapurna Das and Sisir K Das, Tata McGraw-Hill, New Delhi, 2000
4. *Microwave Devices & Circuits*, 3rd Edition, Samuel Y. Liao, Prentice Hall, NJ, 1997

- **ROBOTIC AND AUTOMATION SYSTEM**

BER 4113 KAWALAN DIGIT

SYNOPSIS :

Mata pelajaran ini adalah mengenai pengenalan kepada system kawalan digit, analisis domen-z, rekabentuk kawalan digit menggunakan londar punca, sambutan frekuensi dan kaedah keadaan ruang. Pengenalan kepada kawalan optimal.

REFERENCES :

10. *Digital Control of Dynamic Systems*, Franklin, G. F., Powell, J. D. and Workman, M., 3rd Edition, Addison-Wesley, 1998
11. *Digital Control, A state- Space Approach*, Vaccaro, R. J., McGraw Hill, 1995
12. *Digital Control System Analysis and Design*, Phillips, C., and Nogle, T., Prentice Hall, 1998
13. *Continuous and Discrete Control Systems*, Dorsey, J. McGraw-Hill, 2002

BER 4213 SISTEM AUTOMASI FLEKSIBEL

SYNOPSIS :

Konsep dan pengenalan kepada sistem automasi fleksibel. Mesin kawal angka, sistem pembuatan fleksibel – peralatan bagi sistem pembuatan fleksibel, pusat mesin, sel pembuatan fleksibel. Sistem penghantaran bahan automatik, pemeriksaan sistem dan ujian bantuan komputer.

REFERENCES :

1. *Robot Technology Fundamentals*, Keramas, J.G., Delmar Thomson Learning, 1999
2. *Modeling, Simulation and Control of Flexible Manufacturing Systems: A Perti Net Approach (Series in Intelligent Control and Intelligent Automation)*, Zhou, M., Venkatesh, K., World Scientific Pub Co., 1999
3. *Robotic Technology : Principles and Practice*, Holzbock, W.G., Van Nostrand Reinhold Co., 1996
4. *Computer-aided design, engineering, and manufacturing : systems techniques and applications*, Cornelius Leondes, Boca Raton, Fla. : CRC Press, 2001

BER 4223 APLIKASI MIKROPENGAWAL

SYNOPSIS :

Pengenalan kepada PIC18F452, Set Arahan, Pembangunan Aturcara, Perhimpunan Berstruktur, Paparan LCD, Penjana denyut Berputar, Penukar Analog ke Digit, Pengukuran Jeda Masa, Antaramuka Bersiri, UART.

REFERENCES :

5. John B. Peatman, *Embedded Design with the PIC18F452*, Prentice Hall, 2003
6. John B. Peatman, *Design with PIC Microcontroller*, Prentice Hall, 2000
7. Jonathan W. Valvano, *Embedded Microcomputer Systems*, Thomson Learning, 2000
8. John Morton, *PIC : your personal introductory course*, Oxford, 2001

BER 4233 SISTEM KAWALAN FUZZY

SYNOPSIS :

Pengenalan kepada pengawal fuzzy, pengawal fuzzy ;permulaan dan binaan asas, aspek rekabentuk pengawal fuzzy. Pengawal fuzzy sebagai pemetaan tak linear, ketegapan sebuah pengawal fuzzy, penekanan perkembangan secara teori dan konseptual dalam pembinaan pengawal fuzzy. Pendekatan kepada rangkaian-neural fuzzy, penyeliaan pengawal fuzzy.

REFERENCES :

1. *Uncertain Rule-based Fuzzy Logic Systems*, Jerry M. Mendel, Prentice Hall, 2001
2. *Fuzzy Control : Synthesis and Analysis*, Shehu S Farinwata, Dimitar Filev, Reza Langari, John Wiley & Son, 2000
3. *Fuzzy Control*, Kevin M. Passino and Stephen Yurkovich, Addison-Wesley, 1998
4. *Fuzzy Engineering*, Kosko, B., Prentice Hall, 1997

BER 4243 ROBOTIK INDUSTRI

SYNOPSIS :

Penderia suis, Penderia julat, Penderia jarak, Penderia sentuh, Penderia daya dan daya kilas, Penderia fotoelektrik, Penderia putaran kedudukan, Transduser robotik.

REFERENCES :

1. *Robtic Explorations*, Martin, F. G., Prentice Hall, 2001
2. *Robot Technology Fundamentals*, Keramas, J. G., Delmar Thompson Publishers, 1999
3. *Handbook of industrial robotics* , 2nd ed., Shimon Y Nof , New York: John Wiley, 1999
4. *CNC robotics : build your own workshop bot*, Geoff Williams, New York: McGraw-Hill, 2003

BER 4253 SISTEM KAWALAN INDUSTRI

SYNOPSIS :

Mata pelajaran ini adalah mengenai sistem kawalan proses, prinsip dan konsep kawalan proses, asasi kawalan, jenis-jenis pengawal, kawalan akhir, penggerak, unsure kawalan, elektronik industri, sistem tekanan, sistem pneumatik industri, sistem tekanan statik dan stim, komponen sistem tekanan, sistem haba, sumber haba industri, pengawal sistem suhu dan pengalatan suhu.

REFERENCES :

1. *Industrial Process Control Systems*, Patrick, P. and Fardo, S., Delmar, 1997
2. *A real-time Approach To Process Control*, W. Y. Svrcek, D.P. Mahoney, B.R. Young, Wiley 2001
3. *Industrial Control System Design*, Grimble, M.J., John Wiley, 2001
4. *Process, Industrial Instruments and Control Handbook*, McMillan, Gregory K, McGraw-Hill, 1999

• **ELEKTRIK KUASA**

**BEK 4113 PENGUKURAN DAN PENGUJIAN
KUASA ELEKTRIK**

SYNOPSIS :

Mata pelajaran ini adalah mengenai pengenalan kepada pengujian peralatan elektrik. Pengujian voltan arus terus bagi peralatan elektrik. Pengujian voltan arus ulangalik bagi peralatan elektrik. Minyak penebat, bendalir, dan gas. Alatubah. Kabel dan aksesori. Suis gear, pemutus litar, dan geganti perlindungan voltan sederhana. Suis gear dan pemutus litar voltan rendah. Motor dan penjana. Pembumian sistem kuasa elektrik.

REFERENCES :

1. *The Complete Lab Manual for Industrial Electricity*, Stephen L. Herman, Thomson Learning, 2001
2. *Electrical Equipment Handbook; Troubleshooting and Maintenance*, Philip Kiameh, McGraw-Hill 2003
3. *Power System Commissioning and Maintenance Practice*, Keith Harker, IEE 1998
4. *Electrical Power Cable Engineering*, William A. Thue, Marcel Dekker, 2003

BEK 4213 SISTEM PENGHANTARAN DAN PENGAGIHAN KUASA ELEKTRIK

SYNOPSIS :

Mata pelajaran ini adalah mengenai susunatur sistem penghantaran, rekabentuk elektrikal dan mekanikal talian, korona, susunatur sistem pengagihan, binaan talian pengagihan, pencawang, pbumian, kawalan voltan dan frekuensi, tarif dan kehilangan kuasa talian.

REFERENCES :

1. *Electrical Power Distribution and Transmission*, Luces M. Farlkenberry, Walter Coffe, Prentice Hall, 1996
2. *Electric Power Systems*, B.M. Weedy, B.J. Cory, John Wiley & Sons, 1998
3. *Electric Machines and Power System*, Nasar, Syed A McGraw Hill, 1995
4. *Electrical Machines, Drives and Power System*, 5th Edition, Theodore Wildi, Prentice Hall, 2002

BEK 4223 PERLINDUNGAN SISTEM KUASA

SYNOPSIS :

Mata pelajaran ini adalah tentang pemutus litar dan perkakasan fius, geganti perlindungan, geganti statik, perlindungan penjana, perlindungan pengubah, basbar dan motor, perlindungan talian penghantaran, geganti perlindungan berasaskan mikropemproses.

REFERENCES :

1. *Switchgear and protection*, M. V. Deshpande, Tata, McGraw Hill, 1999
2. *Power System Protection*, P.M. Anderson IEEE Pres, McGraw Hill, 1999
3. *Power System Protection and Switchgear*, Badri Ram, D.N. Vishwakarma, McGraw Hill, 1999
4. *Electrical Machines, Drives and Power System*, 5th Edition, Theodore Wildi, Prentice Hall, 2002

BEK 4233 REKABENTUK SISTEM ELEKTRIK

SYNOPSIS :

Kursus ini bertujuan untuk mempelajari tentang perancangan rekabentuk sistem elektrik, peraturan pendawaian, pencahayaan, litar kawalan motor, penyerap, aplikasi pengubah, pemilihan peralatan, sistem perkhidmatan, pbumian, standard kebangsaan dan antarabangsa.

REFERENCES :

1. *Electrical Systems Design*, Theodore R. Bosela, Prentice Hall, 2003
2. *Electrical Wiring Industrial, 11th Ed.*, Robert D. L. Smith, Stephen L. Herman, Thomson Learning, 2002
3. *Electrical Wiring Practice, 6th Ed.*, Keith Pethebridge, Ian Neeson, McGraw-Hill, 2002
4. *Handbook of Practical Electrical Design*, J.F. Mc Partland & Brian J. Mc Partland, McGraw-Hill, 1999

BEK 4243 PENJANAAN TENAGA ELEKTRIK

SYNOPSIS :

Kursus ini bertujuan untuk mempelajari tentang penukaran tenaga secara elektromkanikal, asas-asas penjana a.u. satu fasa, penaja segerak tiga fasa, lengkung beban system kuasa, loji kuasa stim, loji kuasa hidroelektrik, penjanaan elektrik suria, dan sistem-sistem penukaran tenaga angin.

REFERENCES :

1. *Renewable Energy Resources*, 2nd Ed., John Twidell, Tony Weir, Taylor and Francis, 2006
2. *Power Generation Technologies*, Paul Breeze, Elsevier, 2005
3. *Power Generation Handbook: Selection, Applications, and Maintenance*, Philip Kiameh, McGraw-Hill, 2003
4. *Power Generation Handbook*; Kiameh, Philip; McGraw-Hill 2002

• **ELEKTRONIK PERUBATAN**

BEU 4213 MEDICAL INSTRUMENTATION 1

PREREQUISITE : BEU4113 (HUMAN PHYSIOLOGY)

SYNOPSIS :

Introduction to medical instrumentation, bio-potential measurement, bio-sensor and analyzer, blood flow measurement, clinical lab devices, medical instruments maintenance, therapy devices and artificial organ, battery cell for medical devices and electrical safety.

REFERENCES :

1. *Introduction to Biomedical Equipment Technology*, Joseph J. Carr and John M. Brown, Prentice Hall Career & Technology, Englewood Cliffs, New Jersey, 2001
2. *Medical Instrumentation Application and Design*, John G. Webster, New York: John Wiley, 1998
3. *Principles of Biomedical Instrumentation and Measurement*, Richard Aston, Merrill Publishing Company, Columbus, 1990
4. *Introduction to Biomedical Engineering*, John Enderle, Academic Press, 2000

BEU 4223 MEDICAL IMAGING

SYNOPSIS :

This course introduces on medical imaging methods and application in diagnosis and recovery, X-Ray criteria, exposure estimation, law and attenuation coefficient, image revolution, ultrasound imaging, radiography and tomography image classification, filtration, compensation and MRI.

REFERENCES :

1. *Principles of Radiographic Imaging: An Art and a Science (3rd Edition)*, Richard R. Carlton and Arlene M. Adler, Delmar Thomson Learning, USA, 2001
2. *Fundamentals of medical imaging*, Paul Suetens, Cambridge University Press, 2002
3. *Foundations of medical imaging*, Zang-Hee Cho, Joie Jones, Manbir Singh, John Wiley, New York 1993
4. *Christensen's Physics of Diagnostic Radiology, 4th Edition*, Thomas L. Curry et al, Lea & Febiger Pub., 1990

BEU 4233 TELEMEDICINE

SYNOPSIS :

This course is about medical information, bio signal processing, filtering, smoothing signal, digitalization, and analysis on application of computer in bio-medical, internet and medical information communication, medical information management, database, standard procedure in exchange information, telemedicine law. Besides, this course will introduce on case study using appropriate software for mange telemedicine system, Tele-conference issues, tele-radiology and DICOM.

REFERENCES :

1. *Introduction to Biomedical Equipment Technology*, Joseph J. Carr and John M. Brown, Prentice Hall Career & Technology, Englewood Cliffs, New Jersey, 2001
2. *Biomedical signal processing and signal modeling*, Eugene N. Bruce, New York: John Wiley, 2001
3. *Telemedicine: medicine and Communication*, Thorzten Buzug, Kluwer Academic, 2001
4. *Nonlinear biomedical signal processing : dynamics analysis and modeling*, Metin Akay, New York : IEEE, 2001

BEU 4243 INSTRUMENTASI PERUBATAN 2

SYNOPSIS :

Pengenalan kepada konsep mekanik biologi, kekenyalan dan kentalan otot, tulang dan tendon, analisis asas mekanik perubatan, bahan-bahan untuk pembuatan alat sokongan fisiologi, peluputan bahan dan ciri-ciri bahan, teknologi untuk mengenalpasit corak-corak DNA, prinsip-prinsip sumber cahaya optik, kesan penyerakan, pembiasan dan pemantulan cahaya dalam tisu, hukum-hukum interaksi cahaya dan tisu, penggunaan optik dalam pengimejan, Etika dan moral sebagai seorang jurutera bio-perubatan.

REFERENCES :

1. *Biomedical Engineering Periodicals, Biomedical engineering*, New York: Consultants Bureau, 2003
2. *Introduction to Biomedical Engineering*, John Enderle, Academic Press, 2000
3. *Medical Instrumentation Application and Design*, John G. Webster, New York: John Wiley, 1998
4. *The biomedical engineering handbook*, Joseph D Brozino, Boca Raton, FL: CRC Press, 1995

• **KEJURUTERAAN KOMPUTER**

BEC4213 MICROELECTRONICS

SYNOPSIS :

This subject is about microelectronics and CMOS IC design. There are 8 chapters including a case study on this subject. In the Introduction to Microelectronic, students learn about the comparison of VLSI technology to other logic technologies such as TTL, ECL, CMOS. The theory of MOS transistors consists of structure and operation of MOS transistors and also the important characteristics and modeling using TCAD. Logic and CMOS Logic Design shall consist of complementary logic, pass transistor gates and logic synthesis. Dynamic Logic shall consist of the types of dynamic logic and clocking. Processing Technology consists of semiconductor material selection, main and important procedures in processing. Design Rules consist of stick diagram, design software and an example of a design using L-Edit.

REFERENCE:

1. IC Mask Design Essential Layout Technique, Christopher Saint and Judy Saint, McGraw-Hill, 2002.
2. Contemporary Logic Design, Randy H. Katz and Gaetano Borriello, Pearson International Edition, 2004.
3. ULSI Technology, C.Y. Chang and S.M. Sze, McGraw Hill International Editions, 2002.

BEC4223 COMPUTER NETWORK

SYNOPSIS :

This subject is about protocols, standard and method in computer networks. The range is from data communication, local area network (LAN), internet and transport protocol, network security and also Internet application. It covering the topics of network topology (LAN, MAN, WAN), protocol architecture, TCP/IP, OSI model, data transmission terminology, types of error, error detection and correction, LAN topology (Star, Bus, Ring, Mesh, Hybrid), IEEE 802.11, addressing and routing protocol, cryptography and network security and also internet application.

REFERENCES:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, Mc Graw Hill, 2006.
2. Data and Computer Communications, 8th Edition, Stallings, William., Prentice Hall, 2006.
3. Computer Networking and the Internet, 5th Edition, Fred Halsall, Addison Wesley, 2005.
4. Introduction to Data Communications and Networking, Wayne Tomasi, Prentice Hall, 2005.
5. Communication Networks: Fundamental Concepts and Key Architectures, Leon-Garcia and Widjaja, McGrawHill, 2000.

BEC4233 COMPUTER SYSTEM ENGINEERING

SYNOPSIS:

This subject introduces the fundamental understanding of the trend and technology of PC systems that would affect overall system performance for instance speed, size, weight and power. It also provides an outline for the main interface devices such as processor, memory, interfaces and others; and the integration required for providing a perfect architecture for the complete computer system.

REFERENCES:

1. Advanced PC Architecture, W Buchanan & A. Wilson, Add Wesley 2001
2. List Course in Digital System Design; J.P. Uyemura; Brooks Pub., 2000.
3. Computer Design and Architecture; S.G. Shiva; 3rd edition; Marcel Dekkar, 2000.
4. Computer Organization and Architecture, William Stalling, Prentice Hall, 2000.
5. Applied PC Interfacing, Communications and Graphics, W Buchanan, Add Wesley 1999

BEC 4243 SISTEM OPERASI

SYNOPSIS :

Mata pelajaran ini adalah mengenai Pengenalan Sistem Pengoperasian iaitu berkenaan Sejarah, Konsep dan Struktur Sistem Pengoperasian, Proses dan Penjadualan iaitu Model Proses dan Penjadualan, Pengurusan Ingatan: dimana asas-asas pengurusan ingatan seperti Swapping, Penggantian Bermukasurat dan Segmentation akan diperkenalkan. Selain daripada itu Pengurusan Peranti seperti Prinsip Perkakasan dan Perisian I/O, Konsep Sampukan, Disks, Clocks dan Terminal Rangkaian. Dan Pengurusan Fail seperti Fail, Direktori, Perlaksanaan dan Contoh Sistem Fail juga akan didedahkan kepada pelajar. Dari segi Keselamatan seperti Persekitaran Keselamatan, Asas Kriptografi, Serangan dari Dalaman dan Luaran, Mekanisma Perlindungan dan Trusted System juga akan dipelajari. Di akhir subjek, pelajar akan didedahkan kepada Kajian Kes seperti UNIX, MS-DOS dan WINDOWS untuk memberi gambaran sebenar sistem pengoperasian yang digunakan.

REFERENCES :

1. *Modern Operating Systems*; 2nd Ed.; Andrew S. Tanenbaum; Prentice Hall; 2001
2. *Operating Systems Principles*; Lubomir F. Bic and Alan C. Shaw; Prentice Hall, 2003
3. *Understanding Operating Systems, 3rd Ed.*; Ida M. Flynn and Ann McIver McHoes; BROOKS/VOLE; 2001
4. *Operating Systems; A Systematic View, 5th Ed.*; William S. Davis and T.M. Rajkumar, Addison Wesley, 2001

BEC 4253 REKABENTUK TERBENAM

SYNOPSIS :

Senibina CPU, Set Arahan, Pembangunan Aturcara, Perhimpunan Berstruktur, Pameran LCD, Penjana denyut Berputar, Penukar Analog ke Digit, Pengukuran Jeda Masa, Subrutin Matematik, Antaramuka Bersiri, UART.

REFERENCES :

1. *Embedded Design with the PIC18F452*, John Peatman, Prentice Hall, 2003
2. *Embedded Systems and Computer Architecture*, G.R Wilson, Newnes, 2002
3. *Design with PIC Microcontroller*, John B. Batman, Prentice Hall, 2000
4. *Embedded Microcomputer Systems*, Jonathan W. Valvano, Thomson Learning, 2000

• **MEKATRONIK**

BEM 4113 KAWALAN DIGIT

SYNOPSIS :

Mata pelajaran ini adalah mengenai pengenalan kepada sistem kawalan digit, analisis domen-z, rekabentuk kawalan digit menggunakan kondar punca, sambutan frekuensi dan kaedah keadaan ruang. Pengenalan kepada kawalan optimal

REFERENCES :

1. *Digital Control of Dynamics Systems*, Franklin, G.F., Powell, J.D. and Workman, M., 3rd Edition, Addison-Wesley, 1998
2. *Digital Control, A State-Space Approach*, Vaccaro, R.J., McGraw-Hill, 1995
3. *Digital Control System Analysis and Design*, Phillips, C., and Nogle, T., Prentice Hall, 1998
4. *Continuous and Discrete Control Systems*, Dorsey, J. McGraw-Hill, 2002

BEM 4213 MEKANISMA DAN MESIN

SYNOPSIS :

Mata pelajaran ini adalah mengenai konsep kinematik dan mekanisme yang akan diaplikasikan dalam rekabentuk mesin elektrik. Bagi tujuan rekabentuk pelajar di ajar berkenaan mekanisme khas, rekabentuk pautan satah, mekanisme ruang dan mekanisme robot.

REFERENCES :

1. *Kinematics, Dynamics and Design of Machinery*, Waldron, K. J. and Kinzel, G. L., John Wiley & Sons, 1999
2. *Mechanism Design- Analysis and Synthesis*, Erdman, A. G., Sandor, G. N., Sridar Kota, Prentice Hall, 2001
3. *Machines and Mechanism*, Myszka, D. H., Prentice Hall, 2002
4. *Advanced theory of mechanisms and machines*, Kolovsky, M.Z., Springer, 2000

BEM 4223 ROBOT CERDIK

SYNOPSIS :

Jenis, rekabentuk dan cara kerja penderia-penderia untuk robot. Perancangan trajektori pemanipulasi robotik. Kaedah-kaedah kawalan pemanipulasi robotik. Pengantaramukaan robot dan komputer. Penglihatan robot. Kecerdikan robot.

REFERENCES :

1. *Robotics, mechatronics, and artificial intelligence : experimental circuit blocks for designers*, Newton C. Braga, Boston: Newnes, 2002
2. *Engineering of mind : an introduction to the science of intelligent systems*, James S. Albus, Alexander M. Meystel, New York: John Wiley, 2001
3. *Logic, Artificial Intelligence and Robotics; LAPTEC 2001*, Jair Minoro Abe, Joao Inacio da Silva Filho, Amsterdam:IOS Press, 2001
4. *Journal of Intelligent and Robotic Systems*

BEM 4233 RANGKAIAN NEURAL DAN LOGIK FUZZY

SYNOPSIS :

Pengawal logik fuzzy; asal usul logik fuzzy, aplikasi penting logik fuzzy, struktur dan kendalian, parameter pengawal fuzzy. Rangkaian neural; komponen asas, idea asas, corak kelompok.

REFERENCES :

1. *Fuzzy Control : Synthesis and Analysis*, Shehu S Farinwata, Dimitar Filev, Reza Langari, John Wiley, 2000
2. *The Essence of Neural Networks*, Callan, R., Prentice Hall, 1999
3. *Robust Systems, Theory and Applications*, Ricardo S. Sánchez-Peña and Mario Sznajder, John Wiley & Sons, 1998
4. *Introduction to Neural Networks*, Kevin Gurney, Taylor & Francis Books, 1997

BEM 4243 ELEKTRONIK KAWALAN

SYNOPSIS :

Kendalian dan rekabentuk litar dan peranti kawalan elektromekanikal, litar pemacu bagi peranti kawalan dan penggerak seperti geganti, solenoid dan motor servo, penderia, pemasa dan litar pembilang; litar kawalan kuasa dan tekniknya, litar penguat servo.

REFERENCES :

1. *Understand electronic control systems*, Bishop O, Newnes, 2000
2. *Industrial control electronics: devices, systems and applications*, Bartelt T, Delmar, 2002
3. *Industrial Electronics and Control*, Bhattacharya S.K., Chatterjee S., Tata McGraw-Hill, 1995
4. *Electronic control of switched reluctance machines*, Miller T.J.E, Newnes, 2001

BEM 4253 SISTEM AUTOMASI INDUSTRI

SYNOPSIS :

Rekabentuk dan operasi penderia automasi, aktuator pergerakan, dan elemen-elemen kawalan bendalir. Teknik-teknik rekabentuk litar kawalan proses-proses berulang. Litar kawalan motor. Analisis dan rekabentuk litar kawalan proses jujukan menggunakan geganti elektromekanikal. Analisis dan rekebetuk litar-litar kawalan jujukan menggunakan get-get logik dan pengawal logik boleh program. Sistem pembuatan automatik.

REFERENCES :

1. *Industrial automation and process control /* Jon Stenerson, Upper Saddle River,NJ: Prentice Hall, 2003
2. *Programmable Controllers : Operation and Application :* Warnock, I G., Prentice-Hall 1998
3. *Automation, production systems, and computer integrated manufacturing*, Mikell P. Groover 2nd ed. Upper Saddle River, NJ: Prentice-Hall, 2001
4. *Automated manufacturing systems : actuators, controls, sensors, and robotics*, S. Brian Morriss, New York : Glencoe, 1995