UNIVERSITI PERTAHANAN NASIONAL MALAYSIA

STRUKTUR PROGRAM

SARJANA MUDA KEJURUTERAAN ELEKTRIKAL DAN ELEKTRONIK (KUASA) (ZK50)

STRUKTUR KURSUS DAN JUMLAH KREDIT KEPERLUAN PROGRAM

Program ditawarkan : **Program Sarjana Muda Kejuruteraan Elektrikal dan Elektronik (Kuasa) (ZK50)**

Jumlah keperluan kredit yang perlu dipenuhi untuk bergraduan adalah seperti mana jadual di bawah dan tempoh pengajian yang perlu diikuti adalah lapan (8) semester lazim. Pecahan kursus yang perlu diambil adalah seperti berikut:

KURSUS	KREDIT (AWAM)	KREDIT (KADET)
Teras Universiti	26	26
Teras Fakulti	18	18
Teras Program	77	77
Elektif Program	9	9
*Elektif Universiti	8	15
JUMLAH KREDIT UNTUK BERGRADUAN	**138**	**145**

* Pelajar Kadet : Elektif Universiti yang perlu diambil adalah ALK (12 kredit) dan Tempur Tanpa Senjata (TTS)(3 kredit)

Pelajar Awam: Elektif Universiti yang perlu diambil adalah PLS (6 kredit) dan mana-mana kursus Ko-kurikulum mengikut pilihan (2 kredit)

HASIL PEMBELAJARAN

Pencapaian pelajar diukur oleh hasil pembelajaran. Hasil pembelajaran ini menetapkan kompetensi yang patut diperoleh oleh pelajar apabila selesai mengikuti satu-satu program pengajian. Berikut adalah 'Programme Learning Outcome' (PEO) bagi Program Sarjana Muda Kejuruteraan dan 'Programme Outcome' (PO) bagi kedua-dua Program Sarjana Muda Kejuruteraan Elektrikal dan Elektronik.

'Programme Educational Objectives' (PEO)

PEO 1 – 'Graduate possess positive personel values; subservient to God, responsible and dedicated to work in societies of diverse backgrounds in serving the community and the nation and able to communicate effectively across a range of contexts and audiences'.

PEO 2 – 'Graduate are technically competent and able to apply their knowledge and skills in performing their duties professionally and ethically as an engineer, leader and/or manager while maintaining their profesional development and contribution for the betterment of the nation and mankind'.

PEO 3 – 'Graduates possess military leadership and profesional qualities contributing towards the development of the nation and worldwide with abilities to respond and adapt readily to changing situations including in time of emergency and during war'.

'Program Outcome' (PO)

Technical Knowledge and Competencies

PO1 - Ability to acquire **and apply knowledge** of sciences, and Electrical-Electronic engineering principles.

PO2 - Ability to acquire in-depth **technical competence** in Electrical-Electronic engineering disciplines.

PO3 - Ability to identify, **formulate and solve** relevance engineering related problems.

PO4 - Ability to utilize systems approach for **analysis and design** components, systems and structures and evaluate operational performance.

Generic Skills

PO5 - Ability to **communicate** effectively and with confidence.

PO6 - Ability to respond and adapt to changing situations with special attention toward **sustainable development**.

PO7 - Ability to function effectively as an individual and/or a **leader** in a team to achieve common goals.

PO8 - Ability to adopt and commit to **professional and ethical** responsibilities.

PO9 - Ability to **incorporate social, cultural, global** and environmental responsibilities as part of professional conduct.

PO10 - Ability to seek and **acquire contemporary knowledge** including defence matters and current issues.

PO11 - Ability to possess **entrepreneurship** qualities.

SENARAI KURSUS TERAS PROGRAM SARJANA MUDA KEJURUTERAAN ELEKTRIKAL DAN ELEKTRONIK (KUASA) YANG PERLU DIPENUHI (77 KREDIT) :

KOD	KURSUS	KREDIT
EEE 1202	Engineering Application (Laboratory)	2
EEE 1213	Digital Electronics	3
EEE 1223	Circuit Analysis I	3
EEE 2123	Circuit Analysis II	3
EEE 2113	Microprocessor and Microcomputer	3
EEE 2131	Electrical and Electronic Engineering Laboratory I	1
EEE 2213	Analogue Electronic Devices	3
EEE 2241	Electrical and Electronic Engineering Laboratory II	1
EEE 2223	Measurement and Instrumentation	3
EEE 2233	Signals and Systems	3
EEE 2243	Digital System Design	3
EEE 3112	Introduction to Multimedia and Applications	2
EEE 3113	Systems Design	3
EEE 3123	Analog Circuit and Device	3
EEE 3133	Electromagnetic Field and Waves	3
EEE 3141	Electrical and Electronic Engineering Laboratory III	1

EEE 3213	Control Engineering	3
EEE 3223	Principles of Communication	3
EEE 3233	Power System	3
EEE 3314	Industrial Training	4
EEE 4102	Engineering Management	2
EEE 4202	Engineers in Community	2
EEP 3243	Electrical Machines	3
EEP 4113	Advanced Power System	3
EEP 4123	High Voltage Technology	3
EEP 4133	Power Electronics	3
EEP 4142	Final Year Project I	2
EEP 4214	Final Year Project II	4
EMT 2512	Engineering Mechanics	2

KOD KURSUS	ELEKTIF PROGRAM (9 KREDIT)	KREDIT
EEE 5223	Control System Design	3
EEP 5213	Renewable Energy	3
EEP 5223	Power System Protection	3
EEP 5243	Electrical Condition Monitoring	3
EEP 5253	Power Utilization	3

SARJANA MUDA KEJURUTERAAN ELEKTRIK DAN ELEKTRONIK (KUASA)

SEMESTER 1				SEMESTER 2			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**	**Kod**	**Kursus**	**Kredit**	**Pra-Syarat**
LAN 1012	Islamic and Asian Civilizations	2		LAN 1032	Ethnic Relation	2	
LAN 1022	Malaysian Nationhood	2		EFA 1203	Engineering Mathematics II (Differential Equations and Transform)	3	
LEL 1012	English For Academic Writing	2		EEE 1202	Engineering Application (Laboratory)	2	
EFA 1103	Engineering Mathematics I (Calculus and Linear Algebra)	3		EEE 1213	Digital Electronics	3	
EFC 1103	Computing I (C dan C++)	3		EEE 2123	Circuit Analysis II	3	EEE1223 EFA1203
EEE 1223	Circuit Analysis I	3					
JUMLAH		**15**		**JUMLAH**	**JUMLAH**	**13**	

INTER-SESI 1			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**
*ALK 1014	Latihan Ketenteraan Umum	4	
DUS1062	Military History	2	

*QKS1621	Tempur Tanpa Senjata (Asas)	1	
JUMLAH		**7**	

*Diambil oleh pelajar Kadet sahaja

SEMESTER 3				**SEMESTER 4**			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**	**Kod**	**Kursus**	**Kredit**	**Pra-Syarat**
LEL 1022	English for Oral Communication	2		LAN 1042	Acculturisation of Entrepreneurship	2	
DUS 2052	Laws of Armed Conflict	2		EFA 2213	Engineering Mathematics IV (Statistics)	3	
EFA 2103	Engineering Mathematics IIIA (Complex Variable and Vector)	3		EEE 2213	Analogue Electronics Devices	3	EEE2123
EMT 2512	Engineering Mechanics	2		EEE 2233	Signals and Systems	3	EEE2123
EEE 2131	Electrical and Electronic Engineering Laboratory I	1		EEE 2243	Digital System Design	3	EEE1213
EEE 2113	Microprocessor and Microcomputer	3	EEE1213				
EEE 2223	Measurement and Instrumentation	3					
JUMLAH		**16**		**JUMLAH**		**14**	

INTER-SESI 1			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**
*ALK 2014	Latihan Ketenteraan Umum	4	
DUS2012	Military Law	2	
*QKS2621	Tempur Tanpa Senjata (Lanjutan)	1	
JUMLAH		**7**	

*Diambil oleh pelajar Kadet sahaja

SEMESTER 5				**SEMESTER 6**			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**	**Kod**	**Kursus**	**Kredit**	**Pra-Syarat**
LFL11X2	Foreign Language I	2		LFL12X2	Foreign Language II	2	LFL 11X2
EFC1203	Computing II (Numerical Methods and Engineering Softwares)	3		DUS2022	Introduction To Strategic Studies	2	
EEE2241	Electrical and Electronic Engineering Laboratory II	1	EEE 2131	EEE3141	Electrical and Electronic Engineering Laboratory III	1	EEE 2241
EEE3112	Introduction to Multimedia Technology & Applications	2		EEE3113	System Design	3	EEE 2213 EEE 2113
EEE3123	Analogue Circuit and Systems	3	EEE 2213	EEE3223	Principles of Communication	3	EEE 2233
EEE3213	Control Engineering	3	EEE 2233	EEE3233	Power System	3	EEE 2123
EEE3133	Electromagnetic Field & Waves	3	EFA2103	EEP3243	Electrical Machines	3	
JUMLAH		**17**		**JUMLAH**		**17**	

INTER-SESI

EEE3314	Industrial Training	4	*
JUMLAH		**4**	

***EEE1223, EEE2123, EEE2213 and Completed 60 Credit Hours

SEMESTER 7				SEMESTER 8			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**	**Kod**	**Kursus**	**Kredit**	**Pra-Syarat**
EEE4102	Engineering Management	2		EEE4202	Engineers In Community	2	
EEP4113	Advanced Power Systems	3	EEE 3233	EEE4123	High Voltage Technology	3	EEE 3233
EEP4133	Power Electronics	3	EEE 3233	EEP4214	Final Year Project II	4	
EEP4142	Final Year Project I	2	**	EEX5XX3	Elective II (Power)	3	
EEX5XX3	Elective (Power)	3		EEX5XX3	Elective III (Inter-field)	3	
JUMLAH		**3**		**JUMLAH**		**15**	

**Completed 90 Credit Hours

INTER-SESI 4			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**
ALK3014	Latihan Ketenteraan Umum	4	
DUM2062	Organisational Leadership	2	
QKS3621	Tempur Tanpa Senjata (Pengukuhan Lanjutan)	1	
JUMLAH		**7**	

*Diambil oleh pelajar Kadet sahaja

Nota : PELAJAR AWAM

i. Pelajar Awam dikehendaki mendaftar mana-mana kursus Ko-kurikulum sebanyak 2 kredit pada mana-mana semester pengajian tertakluk kepada jumlah maksimum kredit dibenarkan.

ii. Kursus PLS perlu didaftarkan 1 kredit setiap semester daripada semester 1 hingga semester 6

SINOPSIS KURSUS TERAS PROGRAM SARJANA MUDA KEJURUTERAAN ELEKTRIK DAN ELEKTRONIK (KUASA)

EEE1202 ENGINEERING APPLICATION (LABORATORY)

To give the basic knowledge skill to the students regarding on installation, design and connection of electrical and electronics circuits. Also to provide the students the skill of using some common electrical components and measuring instruments normally used in electrical and electronic engineering laboratories.

References

Boylestad, R. and Nashelsky. (2002). " Electronic Devices and Circuit theory." 8th ed. Prentice Hall.
Abdul Samad Hanif : "Pemasangan Dan Penyenggaraan Elektrik", DBP.
Trevor Linsley, (2005). " Basic Electrical Installation Work", 4th ed. Newnes
B. L. Theraja & A. K. Theraja : "A Textbook of Electrical Technology".
Md. Nasir Abd. Manan, "Panduan Pendawaian Domestik IEEE" , Third Edition, 2004, ISBN 978-967-950-181-0
Keith Pethebridge, Ian Neeson, "Electrical Wiring Practice" , 7th Edition, McGraw-Hill, ISBN 9780070286412

EEE 1213 DIGITAL ELECTRONICS

This course exposes students to fundamental of digital electronic field. The advantages and disadavantages of digital and analog will be discussed. Aside from that, number and code systems, combinational logic elements and basic sequence will also being covered. Emphasis will be put on output equation generation and truth table for realization using design and minimization techniques. The rationale behind the minimization will be discussed and further elaborate. Besides that, this course will also be focusing on designing simple combinational and sequential logic circuits, arithmetic logic circuits, analysis and synthesis designed combinational circuits by traditional methods as well as introduction to ECAD. All of these combine will further discussed in application based problem solving.

References

Floyd, Digital Fundamental, Pearson, 10th Edition, Pearson, 2009.
Reid, Introduction to Digital Electronics, Thomson, 2008.
Katz, Contemporary Logic Design, 2nd Edition, Pearson, 2006.
Tokheim, Digital Electronics Principal & Applications, 7th Edition, McGraw Hill, 2008
Brown, Fundamental of Digital Logic with Verilog Design, 2nd Edition, McGraw Hill, 2008.
Bignell & Donovan, Digital Electronics, 5th Edition, Thomson, 2007

EEE 1223 CIRCUIT ANALYSIS I

Pre-requisite: EFA 1103 Engineering Mathematics I

This subject is designed to expose students to the fundamental of electric circuits, laws and theorems and make them able to analyze basic electric circuits. It will emphasize on circuits having resistors, capacitors and inductors only with dc supply of voltages or currents. At the end of the course, students should be able to understand laws and theorems of electric circuits involving dc and ac sources. The students should also be able to apply circuit theorems and analysis techniques to analyze dc electric circuits. They should also be able to use Mustisim Software to simulate electric circuits and verify analysis.

References

Alexander and Sadiku, Fundamentals of Electric Circuits, McGraw Hill.
Nilsson and Riedel, Electrical Circuit, Addison Wesley Reading, Massachusets.
Dorf and Svoboda, Introduction to Electric Circuits, McGraw Hill.
De Carlo and Lin, Linear Circuit Analysis: Time Domain, Phasor, and Laplace Transform Approach, Prentice Hall.
William Hart Hayt, Jack Ellsworth Kemmerly, Steven M. Durbin, Engineering Circuit Analysis, McGraw Hill.
J. David Irwin, R. Mark Nelms, Basic Engineering Circuit Analysis, John Wiley & Sons

EEE 2113 MICROPROCESSOR & MICROCOMPUTER

Pre-requisite: EEE 1213 Digital Electronics

This course introduces the students the basic principles and applications of microprocessor. Course emphasized on

understanding the fundamentals of microprocessor operation. Develops skills in writing coherent and error-free assembly language programs. Finally, providing students with experience on designing basic interfacing circuits using microprocessor.This course provides a systems-level understanding of the 80X86 microcomputer and its hardware and software. Equal emphasis is given to both assembly language software and microcomputer circuit design.

References

Walter A. T. , Avtar S.2002. The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications (4th Edition). Prentice Hall.
Brey B.B. 2008. Intel Microprocessors, The (8th Edition). Prentice Hall.
Mazidi M. A. , Mazidi J. , Causey D. 2009. The x86 PC: Assembly Language, Design, and Interfacing,(5th Edition).
Prentice Hall.

Kleitz W. 2002. Digital and Microprocessor Fundamentals: Theory and Application (4th Edition). Prentice Hall.
Brey B.B. 2007. INTEL Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Prentium ProProcessor, Pentium II, III, 4 (7th Edition) Prentice Hall.
Irvine K. R. 2006. Assembly Language for Intel-Based Computers (5th Edition). Prentice Hall.

EEE 2123 CIRCUIT ANALYSIS II

Pre-requisites: EEE 1223 Circuit Analysis I, EFA1203 Engineering Mathematics II

This subject is a continuation of Circuit Theorem I which is focusing on the analysis of DC system. In this subject, the analysis of electrical circuits is extended to AC system which covers sinusoidal steady state, magnetically coupled coils, balanced three phase system, frequency response, Laplace transform, and two port network. The calculation involves complex numbers and transformation of polar to rectangular form and vice versa. Some of the knowledge gained from Circuit Theorem I (network theorems and analysis methods) is required for this subject.

References

Alexander and Sadiku, Fundamentals of Electric Circuits, McGraw Hill.
Nilsson and Riedel, Electrical Circuit, Addison Wesley Reading, Massachusets.
Dorf and Svoboda, Introduction to Electric Circuits, McGraw Hill.
De Carlo and Lin, Linear Circuit Analysis: Time Domain, Phasor, and Laplace Transform Approach, Prentice Hall.
William Hart Hayt, Jack Ellsworth Kemmerly, Steven M. Durbin, Engineering Circuit Analysis, McGraw Hill.
J. David Irwin, R. Mark Nelms, Basic Engineering Circuit Analysis, John Wiley & Sons

EEE 2131 ELECTRICAL AND ELECTRONICS LABORATORY I

This laboratory course consists of experiments in the area of digital electronics,analog electronics,and basic electric. Some of the topics covered are combinational gates, decoder, latch, flip flop, resonan RLC circuit, passive filter, phase measurement and VHDL.

References

Alexander and Sadiku, (2000) Fundamentals of Electric Circuits, 2nd ed. McGraw Hill.
Electric and Electronic Laboratory I Manual, (2006) Department of Electrical, Electronic and Systems Engineering, Faculty of Engineering, Universiti Pertahanan Nasional Malaysia.
Floyd, Digital Fundamental, Pearson.
Mohamed Khalil Hani, (2008) Starter's Guide to Digital Systems VHDL & Verilog Design,2nd ed. Desktop Publisher.
Rubbin and Miller, (2007) Circuit Analysis, 4th ed. Thomson.
Dueck, (2005) Digital Design in CPLD application and VHDL, Thomson.

EEE 2213 ANALOGUE ELECTRONIC DEVICES

Pre-Requisite : EEE 2123 Circuit Analysis II

This course is an introduction course to basic semiconductors and analog devices such as diode, bipolar junction transistor (BJT), field effect transistor (FET) and MOS transistor. This includes understanding on the characteristics of diode, BJT, FET & MOS which are the basic of electronic circuit design. Biasing techniques, DC & AC analysis will be discussed thoroughly. Furthermore, students will have first hand experience on testing and experimenting some of the devices via laboratory session in Electrical & Electronic Engineering Laboratory that will be handled throughout their study here in UPNM. This field will also be further discuss in Analog Circuits & System in the later years.

References

Floyd, Thomas L. (2008), Electronic Devices Conventional Current Version, 8th Edition (International Edition),New Jersey: Pearson.
Boylestad, Robert L. and Nashelsky, Louis (2006). Electronic Devices And Circuit Theory, 9th Edition(International Edition), New Jersey: Pearson. [MAIN REFERENCE]
Malvino, A. P. (1999), Electronic Principles. 6th edition. Glencoe: McGraw-Hill

Microelectronic Circuits by Adel S. Sedra, Kenneth C. Oxford Univ Pr, 20032- Principles and Applications of Electrical Engineering, 5/e by Giorgio Rizzoni. McGraw Hill, 2007
Electronic circuit analysis and design,2/e by Donald A. Neamen. McGraw Hill, 2001

EEE 2223 MEASUREMENT AND INSTRUMENTATION

This course exposes the students to the instrumentation, and its use within measurement systems. At the beginning of the course, the students will be exposed to the principles of measurement which includes units, symbols, standards, and types of errors in the measurement. Next, the students will be exposed to several types of sensors and transducers for thermal, mechanical and optical measurement. The function and techniques of signal conditioning system and convertor will be discussed in the following section. At the end of the course, the students will be exposed to the design of complete measurement and instrumentation system. The focus will be on the selection of sensors, and signal conditioning design

References

Curtis, D.J. (2003). Process Control Instrumentation Technology. Prentice-Hall.
Foster, A.C. (1995). Electronic Instruments and Measurement. Prentice-Hall.
Liptak, B.G. (2003). Instrument Engineer's Handbook. 4th Edition. CRC Press.
Riedel, N. (2008). Electric Circuits. Pearson International Edition.
Morris, A.S. (1993). Principles of Measurement and Instrumentation. Prentice-Hall.

EEE 2233 SIGNALS AND SYSTEMS

Pre-requisite: EEE2123 Circuit Analysis II

The aim of this course is to provide basic knowledge and understanding on system theory especially linear time invariant system for both continuous and discrete time. The content of the course covers topics such as signal and system classification, signal and system representation, types and basic signal operations: sinusoidal, step, pulse, continuous time and discrete convolutions, and mathematical approach in signal and linear system analysis such as Fourier Series, Fourier transform, Laplace transform, z transform and their respective inverse transforms. Filter design is also introduced in this course.

References

Charles L. Phillips, John M. Parr and Eve A. Riskin. 2008. 'Signals, Systems and Transforms Fourth Edition'. Pearson Prentice Hall.
Michael J. Roberts. 2008. 'Fundamentals of Signals and Systems'. McGraw-Hill.
Hwei P. Hsu 1995. 'Schaum's Outline of theory and problems of Signals and Systems'. Mcgraw Hill.
Stuller J. A. 2008. An Introduction to Signals and Systems. Thomson Canada Limited, Toronto.
Lathi, B. P. 2005. Linear Systems and Signals. Oxford University Press Inc, New York.
Haykin, S & Van Veen, B. 2002. Signal and Systems. 2nd Edition. John Wiley, New York.

EEE 2241 ELECTRICAL AND ELECTRONICS LABORATORY II

Pre-requisite : EEE 2131 Electrical Engineering Lab I

This laboratory course consists of experiments in the area of advanced analog electronics, instrumentation and measurement and also electromagnetics. The theory where was covered in the class has been apply in hardware implementation and integrate the knowlenge of the student. Some of the topics covered are Op Amp circuits, Wheatstone bridge, successive approximation ADC, fluid level meter, capacitance meter and wind inductor.

References

Electric and Electronic Laboratory II Manual, Department of Electrical, Electronic and Systems Engineering, Faculty of Engineering, Universiti Pertahanan Nasional Malaysia.
Mohamed Khalil Hani, (2008) Starter's Guide to Digital Systems VHDL & Verilog Design,2nd ed. Desktop Publisher.
Rubbin and Miller, (2007) Circuit Analysis, 4th ed. Thomson.
Dueck, (2005) Digital Design in CPLD application and VHDL, Thomson.
Alexander and Sadiku, (2000) Fundamentals of Electric Circuits, 2nd ed. McGraw Hill.

EEE2243 DIGITAL SYSTEM DESIGN

Pre-requisite: EEE1213 Digital Electronic

This course will cover the principles of digital system design. It builds on logic design principles learned in earlier course, digital electronics. This course demonstrates how digital design and rapid prototyping have been facilitated by FPGAs and hardware description languages. The content of this course includes Combinational & Sequential Logic, Finite State Machine, Register Transfer Level (RTL) Design, Design Flow, High level design, Hardware Description Language, Field Programmable Gate Arrays (FPGAs) and some Advanced Topics in HDL.

References

Vahid F., (2010) Digital Design with RTL Design, Verilog and VHDL, Wiley

Brown & Vrasenic, (2009) *Fundamental of Digital Logic with VHDL Design 3rd Ed.*, Mc Graw-Hill.

Dueck, (2005) *Digital Design with CPLD Applications and VHDL 2nd Ed.*, Thomson

Khalil, (2009) *Starter's Guide to Digital Systems VHDL & Verilog Design 2nd Ed*.

Roth & John, (2008) *Digital Systems Design using VHDL,* Thomson,

Vahid F, (2007) *Digital Design*, Wiley

EEE 3113 SYSTEM DESIGN

Pre-requisites: EEE2213 - Analog Electronics Devices, EEE2113 - Microprocessor & Microcomputer

The course aims to provide realistic understanding of engineering design process, tools implementation of design tools and professional skills. This course provides the fundamental engineering design process such as project selection, needs identification, requirements specification and concept genration. Professional skills related to system design such as teamwork, project management, ethical and legal issues are also included. Students will design a simple system like analog signal generator with the aids of lecturing in a classroom lecture and through discussion.

References

Ford, R.; Coulston, C. (2008) Design for Electrical and Computer Engineers, 1st Edition, Mc GrawHill

Dieter, G.; Schmidt, L. (2009) Engineering Design , 4th Edition, Mc GrawHill

Ulrich, K. (1995). Product Design and Development. New York: McGraw-Hill.

Villanucci, R.S., Avtgis, A.W. & Megow, W.F. (2002). Electronic Techniques: Shop Practices and Construction. 7th ed. New York: Prentice-Hall.

Chapanis, A. (1997). Human Factors in Systems Engineering. New York: Wiley.

Wilcox, A.D. 1990. Engineering Design for Electrical Engineer. Englewood Cliffs: Prentice-Hall

EEE 3123 ANALOGUE CIRCUITS AND SYSTEM

Pre-Requisite : EEE 2213 Analogue Electronic Devices

This is an advancement course from Analog Electronic Devices course where students will learn about functional electronic circuits such as Operational Amplifier, Power Amplifier, Signal Generators & Filters and Devices found in most electronic equipments. Furthermore, students will have first hand experience on testing and experimenting some of the devices via Lab session that will be handle throughout their study here in UPNM.

References

Boylestad, Robert L. and Nashelsky, Louis (2006). Electronic Devices And Circuit Theory, 9th Edition (International Edition), New Jersey: Pearson.

Floyd, Thomas L. (2008), Electronic Devices Conventional Current Version, 8th Edition (International Edition), New Jersey: Pearson.

Malvino, A. P. (1999), Electronic Principles. 6th edition. Glencoe: McGraw-Hill.

Thomas L. Floyd (2001). Fundamentals of Analog Circuits. Prentice Hall.

Daniel M. Kaplan, Christopher G. White (2003). Hands-On Electronics: A Practical Introduction to Analog and Digital Circuits. Cambridge University Press.

Anant Agarwal, Jeffrey Lang (2005). *Foundations of Analog and Digital Electronic Circuits* Elsevier Science & Technology Books.

EEE 3133 ELECTROMAGNETIC FIELDS AND WAVES

Pre-requisite: EFA 2103 Engineering Mathematics III (Complex Variable & Vector)

This course is one of the fundamental in electrical and electronic engineering. Therefore, the course will introduce and discuss the concept, theory and analysis of electromagnetic wave and field. The purposes are for students to understand the basic theory and capable of applying their knowledge of electromagnetic wave and field. Starting with the topic of scalar and vector analysis in three different fields, which are Cartesian, Cylindrical and Spherical. Then, it follows with: Electrostatic and magnetostatic characteristics, properties and equations; Electric and magnetic potentials; boundry conditions; Maxwell's Equation; Plane and spherical wave; Energy flow equation for wave ; Propapation in conductor, insulator and impedance in medium.

References

Sadiku, M.N.O., (2006), Elements of Electromagnetics, 4rd Ed., Oxford University Press
Hayt, Jr. W.H., (2004), Engineering Electromagnetics, 6th Ed., McGraw-Hill International Edition
Ulaby F.T., (2010), Fundamentals of Applied Electromagnetics, 6th Edition Prentice Hall International
Edward J.R, Michael J.C, (2008) Electromagnetics, 2rd Ed., CRC Press.
Rao, N.N., (2004), Elements of Engineering Electromagnetics, 6th Ed., Prentice Hall Upper Saddle River, New Jersey
Stuart M. Wentworth., (2007), Applied Electromagnetics: Early Transmission Lines Approach, John Wiley & Sons,Inc.

EEE 3112 INTRODUCTION TO MULTIMEDIA TECHNOLOGY AND APPLICATIONS

This subject consists of four major components; image, audio, video and multimedia systems. Students will be introduced to multimedia software tools. By the end of the course, students should be able to apply text compression methods, image and video compression techniques. Students will also learn the differences between analog and digital video and illustrate the operation of audio and video streaming. Finally students can demonstrate the configuration and functions of videoconferencing systems, analyze storage requirements and technologies for multimedia data and design multimedia documents using HTML and scripting languages.

References

Li and Drew, (2004) *Fundamentals of Multimedia, Prentice* Hall.
Fred Halsall, (2000) *Multimedia Communications: Applications, Networks, Protocols and Standards*, Addison-Wesley.
Nigel Chapman, (2009) *Digital Multimedia,* Wiley
Bhatnager, Mehta and Mitra, (2002) *Introduction to Multimedia System (Communications, Networking and Multimedia)*, Addison- Wesley.
Stephen McGloughlin, (2000) *Multimedi: Concepts and Practice,* Prentice Hall
Rao, Bojkovic and Milovanovic, (2006) *Introduction to Multimedia Communications: Applications, Middleware, Networkin,* Wiley-Interscience

EEE 3141 ELECTRICAL AND ELECTRONICS LABORATORY III

Pre-requisite : EEE 2241 Electrical Engineering Lab II

This laboratory course enables the students to have hands-on experiences working on communications and power engineering related equipments such as Arithmatic and Logic Unit circuit, PLC, AC and DC machines, load flow analysis, simulation on power systems, analogue modulation, digital modulation, multiplexing techniques, studies on antenna such as measurement of radiation pattern, measurement of wavelength, frequency and VSWR. Students will also benefited from hands-on working with control engineering related equipments.

References

Wayne Tomasi,. (2004). Electronic Communication Systems : Fundamentals Through Advanced., 5th Ed., Pearson Prentice Hall.
Louis E. Frenzel Jr., (2008). Principles of Electronic Communication Systems 3rd Ed. McGraw-Hill
Annapurna Das, Sisir K. Das, (2001), Microwave Engineering, McGraw Hill.
David M. Pozar, (2004), Microwave Engineering, John Wiley & Sons Inc..
Charles I. Hubert (2001)Electric Machines: Theory, Operating Applications, and Control. 2nd Ed. SUP
Norman S. Nise. (2007), Control Systems Engineering. 5th Ed. Wiley.

EEE3213 CONTROL ENGINEERING

Pre-requisites: EEE2233 - Signal & System

This course exposes students to the elementary control theory which including frequency response approach, root locus approach and state state approach analysis and design of control systems, time-domain transient response analysis, frequency and analysis of control systems, steady-state error calculation and compensations of control system via PID controllers. It also exposes students to solve control problems using the technical computing software, Matlab.

References

Dorf, R.C.; Bishop, R.H. (2008). Modern Control Systems. 11th ed. Prentice-Hall International, Inc.
Nise, N. S. (2004). Control Systems Engineering. 4th ed. John Wiley and Sons.
Ogata, K. (2010). Modern Control Engineering. 5th ed. Pearson Education International, Inc
Ogata, K. (2008). Matlab for Control Engineers. International ed. Prentice-Hall International, Inc.
Kuo, B. C. 1995. Automatic Control Systems. 7th ed. Prentice-Hall International, Inc.
Goodwin, G.C.; Graebe, S.T.; Salgodo, M.E.(2000) Control System Design. Prentice Hall International, Inc.

EEE 3223 Principles of Communication

Pre-requisite: EEE2233 Signals and Systems

This course introduces the students the basic principles of communication system. The importance of modulation and the performance of the system in the presence of noise are discussed. The students are also will be given the fundamental concepts of analog modulation particularly of amplitude and angle modulations. Digital modulation techniques are exposed to the students such as ASK, PSK, FSK, BPSK, QPSK and QAM. Topics covered include types, modulated waveforms, transmitters, receivers, and transmission bandwidth and noise impact on the modulation system. Various sampling, quantization and line coding techniques are explained before the study of coded pulse modulation, PCM and delta modulation. Then the waveforms and spectral analysis of bandpass digital transmission are introduced together with system performance in terms of bit error rate. Methods of signal multiplexing such as TDM, FDM and SDM are also presented and compared. Students will then learn about transmission line and smith chart applications as a means to improve the performance of the signal transmission. This course is concluded with introduction to antennas and waveguides for foundation to further expand students' knowledge.

References

Wayne Tomasi,. (2004). Electronic Communication Systems : Fundamentals Through Advanced., 5th Ed., Pearson Prentice Hall.
Lathi, B.P. (2003). Modern Digital and Analog Communications Systems, 3rd Edn., Oxford University Press.
Louis E. Frenzel Jr., (2008). Principles of Electronic Communication Systems 3rd Ed. McGraw-Hill
William D. Stanley, John M Jeffords. (2005). Electronic Communications: Principles and Systems. Thomson.
Carlson A.B., Crilly P.B., Rutledge J.C., (2002), Communication Systems. 4th Edn., New York: McGraw-Hill.
Couch, Leon W. (2001). Digital and Analog Communication Systems, 6th Edn., New Jersey: Prentice-Hall.
Zahedi, Edmond, (2002). Digital Data Communication, Pearson Education, Prentice Hall.

EEE 3233 POWER SYSTEMS

This course covers operation, performance and analytical technique in electrical power generation, transmission and distribution. The covered topics are introduction to alternative energy sources, complex power, phasors, per-unit system, power quality and utilization, power transformer and generator, modeling of short, medium and long transmission lines, frequency and voltage control methods; and optimal power flow. Students will be introduced to PowerWorld Simulator or equivalent tool which is used in real-life power network analysis. Power system in military application will be discussed and site visit for students will be conducted at the end of this course. Students will be exposed to real application of the power systems during the side visit for examples generator set, power transformer and power control system.

References

Hadi Saadat, 2004, Power System Analysis, 2nd Edition, Mc Graw Hill, Singapore.
Glover, J.D., Sarma M.S and Overbye, T. J. , 2008, Power System Analysis and Design, 4th Edition, Thomson Learning, Singapore.
Leonard L. Grigsby, 2007, Power Systems, Taylor and Francis Group, Boca Raton.
Paul M. Anderson and Abdel-Aziz A. Fouad, 2003, Power System Control and Stability, IEE Press.
Arthur R. Bergen and Vijay Vittal, 2000, Power Systems Analysis,2nd Edition, Prentice Hall, New Jersey.

Theodore Wildi, 2006, Electric Machines, Drives, And Power Systems, 6th Edition, Pearson Prentice Hall, New Jersey.
Shoaib Khan, 2008, Industrial Power Systems Leonard L. Grigsby, 2007, Power Systems, Taylor and Francis Group, Boca Raton., Taylor and Francis Group, Boca Raton.

EEE 3314 LATIHAN INDUSTRI (*INDUSTRIAL TRAINING*)

Pre-requisite: EEE1223, EEE2123, EEE2213 Completed 60 Credit Hours

Industrial training exposed the students to the real work setting in various industries or military units for 10 weeks. The students are placed in industries or military units that best suit their area of studies. It is an experimental learning that require the students to learn the process and able to apply their knowledge acquired in actual industrial setting. The knowledge acquire during practical training may be used may be used later in final year class as well as to equip them with sufficient knowledge for their job.

EEP 3243 ELECTRICAL MACHINES

The objective of this course is to provide the student with a basic understanding of the operation of electrical machines and a realistic expectation of their performance. The course will start with review of electricity, magnetism and circuits' fundamentals. The primary focus will be on the knowledge of principle and working of transformers, dc machines, synchronous machines and induction machines. Two types of drives which are servomotor and stepper motor shall be made known to the students at the end of this course.

References

Theodore Wildi, 2006, Electric Machines, Drives, And Power Systems, 6th Edition, Pearson Prentice Hall, New Jersey.
Bhag S. Guru and Huseyin R. Hiziroglu, 2001, Electric Machinery And Transformer, 3rd Edition, Oxford, New York.
Stephen J. Chapman, 2005, Electric Machinery Fundamentals, 4th Edition, Mc Graw Hill, New York.
Mohd Abdus Salam, 2005, Fundamentals of Electrical Machines, Alpha Science, India.
Stephen L. Herman, 2005, Electrical transformers and rotating machines, Thomson Delmar Learning.
D P Kothari and I J Nagrath, 2004, Electric Machines 3rd Edition, Tata Mc Graw Hill, New Delhi.

EEP 4113 ADVANCED POWER SYSTEM

Pre-requisite: EEE3233 Power Systems

This course covers deeper on power system analysis which includes characteristics of faults on transmission line, power flow analysis, protection system, power stability and economic operation. Fault calculation using impedance equivalent circuits, single line-to-ground faults and line-to-line faults will be discussed in this course. The Gauss-Seidel and Newton-Raphson methods for power flow solution; basic operation of current transformers, voltage transformer, relay and switchgear; power-angle and equal-area criterion of stability; and traditional and liberalized markets of power system economics will also be given emphasis in this course. Site visit will be arranged for students to have an exposure to the real application of power system protection for examples current transformer, voltage transformer, relay system and switchgear.

References

Hadi Shadaat , "Power System Analysis" Second Edition, 2002, McGraw -Hill
J. J. Grainger and W. D. Stevenson, "Power System Analysis", McGraw-Hill, Singapore, 1994, ISBN: 0-070-61293-5.
D. T. Vincent, "Electric Power Systems", Simon & Schuster Asia, Singapore, 1992, ISBN: 0-136-78228-0.
A. R. Bergen and V. Vijay, "Power Systems Analysis", 2nd edition, Prentice-Hall, Singapore, 2000, ISBN: 0-136-91990-1.
D. Reimert, "Protective Relaying for Power Generation Systems", Taylor & Francis Group, London, 2006, ISBN: 0-824-70700-1.
L. Powell "Power System Load Flow Analysis", McGraw-Hill, US

EEP 4123 HIGH VOLTAGE TECHNOLOGY

Pre-requisites: EEE 3233 Power Systems

This course deals with the new emerging technology in high voltage engineering. It concentrates on electrical breakdown in insulation systems; generation and measurement aspects of high voltages. The dielectric

strength of insulating material and the electric field stresses when subjected to high voltages will be discussed. Some of important circuit configurations for the generation of high voltage DC, AC and impulse will be covered. Measurement techniques based on different types of potential dividers and spark gaps for DC, AC and impulse measurements will be studied. The course also explains some non-destructive tests like surface and internal discharges, loss factor, partial discharges and tan delta. Familiarity with electrical power system components is useful.

References

M. Khalifa, "High-Voltage Engineering: Theory and Practice", Marcel Dekker Inc, New York, 1990, ISBN: 0-824-78128-7.

E. Kuffel, W. S. Zaengl and J. Kuffel, "High Voltage Engineering: Fundamentals", 2nd edition, Newnes, Singapore, 2000, ISBN: 0-750-63634-3.

M. S. Naidu and V. Kamaraju, "High Voltage Engineering", 3rd edition, McGraw-Hill, Singapore, 2004, ISBN: 0-070-49464-9.

Stephen Andrew Jay, "High Voltage Electricity Installations: A Planning Perspective", ISBN: 978-0-470-03016-5

Bharat Heavy Electricals Limited, "Handbooks of Switchgears", McGraw-Hill, USA.

D.P. Kothari, "Modern Power System Analysis", 1st Edition, 2008, ISBN-13 9780073404554, McGraw-Hill, USA.

EEP 4133 POWER ELECTRONICS

Pre-requisite: EEE3233 Power Systems

This course will introduce the students to the following area of power electronics such as overview of power electronics systems and applications, power devices technology and drivers, snubbers, power losses and switching techniques. Single-phase and three-phase for control and uncontrollable rectifier; chopper and inverter will be explained in details in this course. At the end of this course total harmonics distortion (THD) and pulse width modulation (PWM) will be discussed further.

References

Rashid, M.H., "Power Electronics: Circuits, Devices & Applications", 3rd Edition 2004, Prentice Hall

Mohan, Undeland and Robbins, "Power Electronics; Converters, Application and Design", 3rd Edition, John Wiley and Sons Inc.

P.C. Sen, "Principles of Electric Machines and Power Electronics", 2nd Edition, 1996, John Wiley and Sons Inc. , ISBN: 978-0-471-02295-4

Cyril W. Lander, "Power Electronics", 3rd Edition, McGraw-Hill International Edition

M.D. Singh and K.B. Khanchandani, "Power Electronics", 2nd Edition, McGraw-Hill

V.R. Mororthi, "Power Electronics; Devices, Circuit and Industrial Applications", Oxford University Press

EEE 4102 ENGINEERING MANAGEMENT

This course exposes the students with the required knowledge to utilize appropriate management tools and techniques in the context of Electrical Engineering projects. It covers variety of aspect including issues and management as a problem solving process. Project tasks, deliverables, responsibilities and timing requirements needed to manage project on time and within budget will be considered. The necessary knowledge to develop skills for such activities will be provided

References

Chang, Engineering Management : (2004) Challenges in the New Millennium, Prentice Hall.

Cleland, Project Management : (2007) Strategic Design and Implementation, 5th Edition, Mc Graw-Hill.

Morse, (2006) Managing Engineering and Technology, Prentice Hall.

Schwalbe , (2006) Introduction to Project Management, Cengage.

Smith, (2006) Engineering Project Management, Wiley-Blackwell.

Eisner, (2008), Essential of Project & System Engineering Management, 3rd Edition, Wiley.

Blanchord, (2008), System Engineering Management, 4th Edition, Wiley.

EEE 4202 ENGINEERS IN COMMUNITY

This course highlights to students the profession of engineering, how to become professional engineers, their roles and responsibilities to benefit mankind. Students are introduced to the relevant acts, regulations,

standard, patent and code of engineering ethics. Students are also exposed to ethical problem, risk, safety and accidents in engineering practice. Based on those theories, principles and code of engineering ethics, students will analyze engineering issues and carry out case studies. They will present for class discussion.

References

Charles B. Fleddermann (2008), Engineering Ethics, 3rd edition, E Source Prentice.
Charles E.Harris, Michael S. Pritchard, Michael J. Rabins (2009). Engineering Ethics Concept and Cases, 4th Edition, Wadsworth Cengage Learning.
Collins S, (1989) The Professional Engineer In Society, Jessica Kingsley, 1989.
Stephen F. Johnston, J. Paul Gostelow, W.Joseph King (2000), Engineering and Society, Prentice Hall.
Ralph M. Ford, Chris S. Coulston (2008). Design for Electrical and Computer Engineers. McGraw-Hill International.
R. Barras, (2002) Scientist Must Write: A Guide to better writing for scientist, engineers, and students , London, Rouledge, 2nd Edition.
Registration of Engineers Act 1967 and Registration of Engineer Regulation 1990.
Occupational Safety and Health Act 1994.
Electricity Supply Act (1990) and Subsidiary Legislations.
Contract Act 1950 (Revised 1974).

EEP 4142 FINAL YEAR PROJECT I

Final year student is required to take a small scale research project. This project aims to expose students to conduct research works in order to solve engineering problems. The research works include literature survey, analysis of previous works, research experimental design and executing experimental work, collecting data, discussion, dissertation writing and oral presentation. In this stage, students have to carry out literature survey in order to understand the nature of the problem and identify the approriate research methodology.

References

Students are expected to find their own reference materials

EEP 4214 FINAL YEAR PROJECT II

This course is the extension of the researh work done in Final Year Project 1. In this stage, students have to do data collecting & analyzing, dissertation writing and oral presentation. The completion of the project is based on effective time management.

References

Students are expected to find their own reference materials.

SINOPSIS KURSUS ELEKTIF PROGRAM SARJANA MUDA KEJURUTERAAN ELEKTRIK DAN ELEKTRONIK (KUASA)

EEP 5243 ELECTRICAL CONDITION MONITORING

Pre-requisites: EEE 3233 Power Systems
EEP 3243 Electric Machines

During this course, students will study the theory and design of condition monitoring systems. The course advances to address detection system, Reliability Centered Maintenance (RCM), SCADA systems, data analysis and interpretation, electrical maintenance of generators, motors, transformers, switchboards and power cables. Condition monitoring for military applications will also be discussed among students through report writing and group presentation.

References

B. S. Dhillon, "Engineering Maintenance: A Modern Approach", CRC Press, Florida, 2002, ISBN: 1-587-16142-7.
R. Barron, "Engineering Condition Monitoring: Practice, Methods and Applications", Longman, England, 1996, ISBN: 0-582-24656-3.
F. Ansari, "Condition Monitoring of Materials and Structures", American Society of Civil Engineer, Virginia, 2000, ISBN: 0-784-40495-X.

E. D. Yardley, "Condition Monitoring: Engineering the Practice", Professional Engineering Publishing, United Kingdom, 2002, ISBN: 1-860-58361-X.
Bharat Heavy Electrical Limited, "Transformers", McGraw-Hill, US
Greg Stone, Edward A. Boulter, Ian Culbert, Hussein Dhirani, "Electrical Insulation for Rotating Machines: Design, Evaluation, Aging, Testing, and Repair", 2004, Wiley-IEEE Press, ISBN: 978-0-471-44506-7

EEP 5233 POWER SYSTEM PROTECTION

Pre-requisites: EEP 4113 Advanced Power Systems

This course is designed to introduce students to the basic understanding of power system protections. The designs and applications of power protection components are discussed. A better understanding of earthing, bonding and two protection schemes will be introduced. At the end of the course, the students will present their self studies on power protection systems of marine and aerospace.

References

L. G. Hewitson, M. Brown and R. Balakrishnan "Practical Power System Protection", Newnes, ISBN: 0-750-66397-9. A. Kalam and D. P. Kothari, "Power System Protection and Communication", New Age Science, 2009, ISBN: 1-906-57426-X.
Gerhard Ziegler, "Numerical Distance Protection: Principles and Applications", 3rd Edition, 2008, ISBN: 978-3-89578-318-0
P. M. Anderson, "Power System Protection", IEEE Computer Society Press, 1999, ISBN: 0-780-33427-2.
The Electricity Training Association, "Power System Protection", Institution of Electrical Engineers, 1995, ISBN: 0-852-96836-1.
C. Christopoulos and A. Wright, "Electrical Power System Protection", 2nd edition, Kluwer Academic Publishers, 1999, ISBN: 0-412-81760-8.

EEE 5223 CONTROL SYSTEM DESIGN

Pre-Requisite: EEE3213 Control Engineering

To study the analysis and design techniques for control systems using state space approach, system identification and optimal control. To apply Z transform and discrete time system and understand the state space variable and state space modelling of dynamic systems. To apply the system identification of any mathematical model and able to describe the optical control. Understand the advance control technique and last but not least to design and analyze the PID controller.

References

Astrom K.J. and Wittenmark B., (1997), Computer Controlled Systems Theory and Design, 3rd ed., Prentice Hall.
John C. Doyle, Bruce A. Francis, and Allen R. Tannenbaum (2009) Feedback Control Theory (Dover Books on Engineering).
Franklin G.F., Powell J.D. and Emani-Naeni A (1994), Feedback Control Systems, 3rd ed., Addison-Wesley.
Ljung L,(2001), System Identification: theory for the User, 2nd ed., Prentice-Hall.
Ogata, K. (2002), Modern Control Engineering (4th Edition). Pearson Education International, Inc.
Vaccaro R.J., (2008), Digital Control: A state-space Approach, McGraw-Hill.

EEP 5253 POWER UTILIZATION

Pre-Requisite: EEP 4113 Advanced Power Systems

In this strategic course the learner will have an exposure on the concept of utilization of power generation, distribution and overcurrent protection as well as power factor correction issues. The learner also will be introduced to power quality problems. Every student will be grouped to present their mini research on a topic which will be provided by lecturer at the end of this course

The main objective of this course is to impart the knowledge, understanding and synthesis in the power utilization field. This course is an extension of power system, whereby the power generation, transmission and distribution will be discussed in detail. Economic considerations, industrial power utilizations, direct current transmission and power quality will be also part of this course. Topics such as types and load characteristics as well as the load factor calculation together with power reliabilty will conclude this course.

References:

Understanding Power Quality Problems, Voltage Sags & Interruption, Math H.J.Bollen

Electrical Power Distribution, A. S. Pabla, McGraw Hill.
IEEE Recommended Practice for Powering and Grounding Electronic Equipment, IEEE Std 1100-1999
Utilization of Electrical Power, R. K. Rajput, Laxmi Publications (P) Ltd.
Power System Engineering, R. K. Rajput, Laxmi Publications (P) Ltd.

EEP 5213 RENEWABLE ENERGY

Pre-Requisite: EEP 4113 Advanced Power Systems

In this strategic course with the new emerging technology of renewable energies, it covers the spectrum from solar energy, biomass, hydro, wind, tidal and wave technologies to renewable energy policies, economic factors and environmental impacts. This course also discusses the basic concepts of solar collectors, solar applications, bio-energy sources, production of gaseous and liquid fuels from biomass, types of turbine runner, tidal generator and wind turbine types. Every student will present his mini research on a topic which will be provided by lecturer at the end of this course.

References:

G. Boyle, "Renewable Energy: Power for a Sustainable Future", Oxford University Press, United Kingdom, 2004, ISBN: 0-199-26178-4.
J. A. Duffie and W. A. Beckman, "Solar Engineering of Thermal Processes", 3rd edition, John Wiley & Sons Inc, United States of America, 2006, ISBN: 0-471-69867-9.
N. Schlager and J. Weisblatt, "Alternative Energy", Thomson Gale, China, 2006, ISBN: 1-441-40507-3.
S. Mathew, "Wind Energy: Fundamentals, Resource Analysis and Economics", Springer Berlin Heidelberg, New York, 2006, ISBN: 3-540-30905-5.
P. Komor, "Renewable Energy Policy", Diebold Institute, United States of America, 2004, ISBN: 0-595-31218-7.
Volker Quaschning, "Renewable Energy and Climate Change", Wiley-IEEE Press, 2009, ISBN: 978-0-470-74707-0