JABATAN KEJURUTERAAN ELEKTRIK DAN ELEKTRONIK

Pensyarah Kanan

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BSEE (Valparaiso, Indiana), MEE (UTM), P.Eng MIEM

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BSEE (Comp.Eng) (Texas at Austin), M.Sc. (IT) (UiTM) MIEEE, MMSET

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Tutor

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B Eng (Telecommunication)(UM)

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M.Eng (Electrical), (Sheffield)

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B.Eng (Hons)(Portsmouth), M.Sc (Portsmouth)

Aniza binti Abd Karim*

***** *Cuti belajar*

STRUKTUR KURSUS DAN JUMLAH KREDIT KEPERLUAN PROGRAM

Program ditawarkan : **Program Sarjana Muda Kejuruteraan Elektrikal dan Elektronik (Komunikasi) (ZK25)**
Program Sarjana Muda Kejuruteraan Elektrikal dan Elektronik (Kuasa) (ZK50)

Jumlah keperluan kredit yang perlu dipenuhi untuk bergraduan bagi kedua-dua program adalah 138 kredit dan tempoh pengajian yang perlu diikuti adalah lapan (8) semester lazim. Pecahan kursus yang perlu diambil adalah seperti berikut:

KURSUS	KREDIT
Teras Universiti	26
Teras Fakulti	18
Teras Program	77
Elektif Program	9
*Elektif Universiti	8
JUMLAH	**138**

* Pelajar Kadet : Elektif Universiti yang perlu diambil adalah ALK dan Tempur Tanpa Senjata (TTS)
Pelajar Awam: Elektif Universiti yang perlu diambil adalah PLS dan mana-mana kursus Ko-kurikulum mengikut pilihan

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 Program Sarjana Muda Kejuruteraan Awam.

'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 - 'Be able to integrate and design systems and components systematically to fulfil the requirements while taking into considerations of any economical, social, ethical, health, safety and sustainability and environmental issues in Electrical & Electronic Engineering'.

PO2 - 'Be able to use and gather facts in mathematics and sciences, and also in fundamental and specific knowledge in solving complex engineering problems'.

PO3 - 'Be able to analyse complex problems, to include designing experiments, analysis and interpretation of data and synthesising information in arriving to sound conclusion'.

PO4 - 'Realise the need of lifelong learning, seeking new knowledge and skills, and innovative knowledge analysis'.

Generic Skills

PO5 - 'Be able to establish cultural and personality sensitive climates that enable effective communications and improve interactions with subordinates, team members, peers, and general public'.

PO6 - 'Be able to demonstrate the understanding of their roles and responsibilities, as leaders or team members in protecting public well being by taking collaborative actions in multi-disciplined teams '.

PO7 - 'Possess strong spiritual values and decorum, act ethically and demonstrating sensitiveness towards safety and the environment in executing duties '.

PO8 - 'Be able to demonstrate the understanding of the elements in project management, assets management and public policies, administrations, business and entrepreneurship '.

PO9 - 'Be able to demonstrate the understanding about military organisations, equipments and current issues '.

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

KOD	KURSUS	KREDIT
EEC 3243	Digital Communications	3
EEC 4113	Data Communication	3
EEC 4123	Antenna and Radio Propagation	3
EEC 4133	Computer Architecture and Organisation	3
EEC 4142	Final Year Project I	2
EEC 4214	Final Year Project II	4
EEE 1202	Engineering Application (Laboratory)	2
EEE 1213	Digital Electronics	3
EEE 1223	Circuit Theorem I	3

EEE 2113	Microprocessor & Microcomputer	3
EEE 2123	Circuit Theorem II	3
EEE 2131	Electrical and Electronic Engineering Laboratory I	1
EEE 2213	Analogue Electronic and Devices	3
EEE 2223	Measurement and Instrumentation	3
EEE 2233	Signals and Systems	3
EEE 2241	Electrical and Electronic Engineering Laboratory II	1
EEE 2243	Digital System Design	3
EEE 3112	Introduction to Multimedia Technology & Applications	2
EEE 3113	System Design	3
EEE 3123	Analog Circuit and System	3
EEE 3133	Electromagnetic Field and Waves	3
EEE 3141	Electrical and Electronic Engineering Laboratory III	1
EEE 3213	Control Engineering	3
EEE 3223	Communication Theorem	3
EEE 3233	Power Systems	3
EEE 3314	Industrial Training	4
EEE 4102	Engineering Management	2
EEE 4202	Engineers in Community	2
EMT 2512	Engineering Mechanics	2

KOD KURSUS	ELEKTIF PROGRAM (9 KREDIT)	KREDIT
EEC 1213	High Frequency Circuit Design and Engineering	3
EEC 1223	Radio and Satellite Communication	3
EEC 2123	Optical Communication System	3
EEE 5223	Control System Design	3

STRUKTUR PROGRAM PENGAJIAN
SARJANA MUDA KEJURUTERAAN ELEKTRIK DAN ELEKTRONIK (KOMUNIKASI)

SEMESTER 1				SEMESTER 2			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**	**Kod**	**Kursus**	**Kredit**	**Pra-Syarat**
LAN 1012	Islamic and Asian Civilizations	2		LAN 1032	Ethnic Relations	2	
LAN 1022	Malaysian Studies	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 Theorem II	3	EEE1223 EFA1203
EEE 1223	Circuit Theorem I	3					
JUMLAH		**15**		**JUMLAH**		**13**	

INTER-SESI 1			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**
ALK/PLS 1012	LKU1	2	
DUS1062	Military History	2	
JUMLAH		**4**	

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 and 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 2			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**
ALK/PLS 2012	LKU2	2	
DUS2012	Military Law	2	

JUMLAH		4	

SEMESTER 5				SEMESTER 6			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**	**Kod**	**Kursus**	**Kredit**	**Pra-Syarat**
LFL11X2	Foreign Language I	2		LFL12X2	Foreign Language II	2	LFL11X2
EFC 1203	Computing II (Numerical Methods and Engineering Softwares)	3		DUS2022	Introduction To Strategic Studies	2	
EEE 3112	Introduction to Multimedia Technology & Applications	2		EEC 4133	Computer Architecture and Organisation	3	EEE 2113
EEE 3113	System Design	3	EEE 2213 EEE 2113	EEE 3213	Control Engineering	3	EEE 2233
EEE 3123	Analogue Circuit and Systems	3	EEE 2213	EEE 3223	Communication Theorem	3	EEE 2233
EEE 3133	Electromagnetic Fields and Waves	3	EFA2103	EEE 3233	Power System	3	EEE 2123
EEE 2241	Electrical and Electronic Engineering Laboratory II	1	EEE 2131	EEE 3141	Electrical and Electronic Engineering Laboratory III	1	EEE 2241
JUMLAH		**17**		**JUMLAH**		**17**	

INTER-SESI			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**
EEE 3314	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**
EEC 4113	Data Communication and Multimedia System	3		EEC 4214	Final Year Project II	4	EEC4142
EEC 4123	Antenna and Propagation	3	EEE 3133	EEE 4202	Engineers In Community	3	
EEC 3243	Digital Communication	3	EEE2113	EEE4102	Engineering Management	2	
EEC 4142	Final Year Project I	2	**	EEX 5XX3	Elective II	3	
EEX 5XX3	Elective I	3		EEX 5XX3	Elective III	3	
JUMLAH		**14**		**JUMLAH**		**16**	

** Completed 90 Credit Hours

INTER-SESI 4			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**
ALK/PLS 3012	LKU3	2	
DUS 2062	Organisational Leadership	2	
JUMLAH		**4**	

Nota : i. Pelajar Kadet dikehendaki mendaftar kursus Tempur Tanpa Senjata pada setiap semester kedua Tahun 1, 2 dan 3 pengajian.

ii. Pelajar Awam dikehendaki mendaftar mana-mana kursus Ko-kurikulum sebanyak 2 kredit pada

mana-mana semester pengajian

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

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 THEOREM 1

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 THEOREM II

Pre-requisites: EEE 1223 Circuit Theorem 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.

Reference

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 Theorem II

This 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 basis of electronic circuit design. Biasing techniques, DC & AC analysis will be discuss thoroughly. 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.
This field will be further discuss in Analog Circuits And Devices in the later years.

References

Boylestad, Robert L. and Nashelsky, Louis (2006). Electronic Devices And Circuit Theory, 9th Edition(International Edition), New Jersey: Pearson. [MAIN REFERENCE]
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
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 Theorem 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 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 COMMUNICATION THEOREM

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 and 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.

EEC 3243 DIGITAL COMMUNICATIONS

Pre-requisites: EEE2123 Circuit Theorem II

This course exposes students to the theory and practice of digital communication. Varieties of digital modulation systems will be introduced, comparison on systems performance such as the usage of bandwidth and noise effect will be discussed. The course will model and study the effects of channel impairments such as noise and distortion on the performance of communication systems; introduce signal processing, modulation, and coding techniques that are used in digital communication systems.

References

Haykin S., (2006) *An Introduction to Digital and Analog Communications*, *2nd. Ed.*, Wiley.
Proakis J., (2001) *Digital Communications*, 4th. ed., Mc-Graw Hill.
Proakis & Salehi, (2002) *Communication Systems Engineering 2nd. Ed.*, Prentice Hall.
Sklar B., (2002) *Digital Communications: Fundamentals & Applications*, *2nd. Ed*. ,Prentice Hall.
Robert G. Gallager (2008) Principles of Digital Communication,Uviversity Press Cambridge.
John R. Barry, David G. Messerschmitt, and Edward A. Lee(2003), Digital Communication: Third Edition,Kluwer Academic Publisher

EEC 4113 DATA COMMUNICATION

The subject covers three general areas which are data communications, networking and protocols. Data communications deals with transmitting signals in a reliable and effiecient way while networking deals with the technology and architecture of the communications networks used to interconnect communicating devices. Protocols defines what, when and how data is communicated. At the end of the course, students should be able to understand the system used in representation, distribution, transmission and reception of data.

References

William Stallings, (2007), Data and Computer Communications, Prentice Hall, 8th edition
B. A Forouzon,(2006), Data and Computer Networks, McGraw Hill
F. Hallsall, (1998), Data Communication, Computer Network and Open System, Addison Wesley, 6th Edition
Wayne Tomasi, (2005), Introduction to Data Communications and Networkin, Prentice Hall
Tanenbaum, A.S., (2002), Computer Networks, 4th edition, Prentice Hall International

Gurdeep S. Hura, (2001), Data and Computer Communications: Networking and Internetworking , CRC Press

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

EEC 4123 ANTENNA AND PROPAGATION

Pre-requisite: EEE 3133 Electromagnetic Field and Waves

This course is an extension course for the basic communication course, which gives emphasis to the transmission medium. The course begins with transmission lines and antenna and also its solution method. Next, microwaves propagation method, source, passive and active devices will be introduced. The course will be ended with examples of the system that use this kind of transmission method, such as radio and TV. The main objective of this course is to introduce the students to the important elements in electromagnet engineering field such as the concept of transmission lines, wave propagation phenomena and microwaves application in our daily life.

References

Joseph F. White. (2004), High Frequency Techniques: An Introduction to RF and Microwave Engineering. John Wiley & Sons Inc..
Daniel M. Dobkin. (2005), RF Engineering for Wireless Networks: Hardware, Antennas, and Propagation (Communications Engineering). Elsevier Inc.
Annapurna Das, Sisir K. Das, (2010), Microwave Engineering, 2nd Ed. McGraw Hill.
David M. Pozar, (2004), Microwave Engineering, John Wiley & Sons Inc..
David M. Pozar, (2000), Microwave and Rf Design of Wireless Systems, John Wiley & Sons Inc..
Ulaby F.T., (2010), Fundamentals of Applied Electromagnetics, 6th Edition Prentice Hall International
Samuel Y. Liao, (2007), Microwave Devices and Circuit, 3rd. Ed. Prentice-Hall.

EEC 4133 COMPUTER ARCHITECTURE AND ORGANISATION

Pre-requisite: EEE 2113 Microprocessor and Microcomputer

This course introduces machine language, computer architecture, data representations and aspects of distributed systems. Topics include conventional von Neumann architecture, the internal representation of data, instruction sets and formats, addressing, the fetch/execute cycle, memory architectures, and I/O architectures, as well as an overview of distributed, multiprocessor and parallel systems.

References

Stalling W., (2008) Computer Organization & Architecture: Designing for Performance, 8th ed., Prentice Hall.
Murdocca M., (2007) Computer Architecture & Organization: An Integrated Approach, Wiley.
Morris M., (2007)Computer System Architecture, 3ed., Prentice Hall.

Hennesy J., (2006) Computer Architecture: A Quantitative Approach 4th ed., Morgan Kaufmann
Abd el Barr (2005) Fundamental of Computer Organization and Architecture, Wiley.
El Rewini (2005) Advance Computer Architecture and Parallel Processing, Wiley.

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 4203 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 (KOMUNIKASI)

EEC 5213 MICROWAVE

Pre-requisite : EEE 3133 Electromagnetic Field & Waves

The objective of this course is to give knowledge, understanding and ability to design high frequency circuit. It is an advance course for the high frequency communication engineering field. It gives emphasis to transmission line analysis focusing on microstrip line, single and multiple port network analysis especially S-parameter and flow diagram, RF filter design, impedance matching techniques, transistor amplifier analysis and design and some other RF circuits. Computer aided software package such as IE3D, Sonnet, and Ansoft Serenade will be introduced to help students to design high frequency circuit. Students will also be exposed to the usage of RF and microwave devices such as signal generator, signal analyzer, and network analyzer for circuit testing purpose.

References

Ludwig R. dan Bretchko P. (2000). *RF Circuit Design – Theory and Applications*, Prentice-Hall.
Pozar, D. M. (2005).*Microwave Engineering*, 3rd Edition, John Wiley.
Pozar, D.M (2001).*Microwave and RF Design Of Wireless Systems*, John Wiley.
Fooks, E.H. and Zakarevicius R. A. (1990). *Microwave Engineering Using Microstrip Circuits,* Prentice-Hall.
Gonzales G. (1997). *Microwave Transistor Amplifier – Analysis and Design,* Prentice-Hall.

EEC5223 RADIO AND SATELLITE COMMUNICATION

This course will introduce students to two communication systems, which are radio communication system especially cellular and personal radio, and satellite communication system. Starting with the history, development and standardization, the basic concept of the system then will also be discussed. This course also involves studies on propagation and fading effect, cell planning, link and traffic budget, access schemes, modulation and system design. Some applications of the radio and satellite communication will be discussed at the end of this course.

References

Garg V.K, Wilkes J.E, (1996) *Wireless and Personal Communications Systems*, Prentice Hall.
Macario, R.C.V.,(1993) *Cellular Radio: Principles and Design*, MacMillan.
Pratt T., Bostian C., & Allnutt J., (2003) Satellite Communications, 2nd Edn., Wiley.
Rappaport, T.S*,* (2002) *Wireless Communication, 2nd. Ed.* Prentice Hall,
Richharia, M., (1995) *Satelite Communications System Design Principles*, MacMillan

EEC 5243 OPTICAL COMMUNICATION SYSTEM

The course started with introduction to optical fiber technology and its application as line transmission. Transmitter and receiver are also given next. Starting from here the optical communication is seen as a system. It is introduced in point to point until network configuration. The exposure to optical equipment handling such as splicer machine and Optical Spectrum Analyzer is also included in this subject. Optical communication optic is also studied in laboratory such as forensic experimental.

References

Agrawal, G. P. (2004) *Fiber-Optics Communication Systems*. 2nd Edition. Wiley.
Cedric F.Lam (2007) Passive Optical Networks: Principles and Practice .Elsevier
Keiser, G. (2000). *Optical Fiber Communication.* 3rd Edition. McGraw Hill.
Palais, J. C., (2001). *Fiber Optic Communication,* 4th Edition. Prentice Hall.

Senior, J. M. (1992). *Optical Fiber Communications,* 2nd Edition. Prentice Hall.

EEC 5233 INTRODUCTION TO RADAR

Learn the basic concepts of radar, how it works and why and discover how targets are resolved in angle, range and velocity. The radar range equation is developed in a form including signal integration, the effects of target cross section, fluctuations, and propagation losses. Modern techniques discussed include pulse compression frequency modulated radar, moving target indicator (MTI) and pulse Doppler systems, monopulse tracking systems, multiple unit steerable array radars, synthetic aperture systems and measurement of radar cross section of targets.

References

Merrill I. Skolnik(2002), Introduction to Radar Systems, McGraw-Hill Companies
J. C. Toomay, John C. Toomay, Paul Hannen, Paul J. Hannen (2004), Radar Principles for the Non-Specialist , SciTech Publishing.
Bassem R. Mahafza(2008) , Radar Signal Analysis and Processing Using MATLAB , Chapman & Hall/CRC.
Ronald D. Bouwman (2009), Fundamentals of Ground Radar: For Air Traffic Control Engineers and Technicians
Philip Pace, (2009), Detecting and Classifying Low Probability of Intercept Radar.
George W. Stimson, (1998), Introduction to Airborne Radar. SciTech Publishing

EEC 5253 ANTENNA SYSTEM DESIGNS

Pre-requisite : EEC 4123 Antenna and Propagation

This course focuses on antenna fundamentals, practical antenna design, and antenna measurement techniques. The subject consists of an antenna transmitter module and an antenna receiver module, with a Radiation Pattern. Students are introduced to antenna fundamental, antenna parameters, impedance matching techniques for practical antenna design. Antenna measuring techniques are also introduced.

References

Robert S. Elliott (2003), Antenna Theory & Design. Wiley, John & Sons, Incorporated.
Alejandro Aragon-Zavala, Simon R. Saunders (2006). Antennas & Propagation for Wireless Communications .Wiley, John & Sons, Incorporated .
Victor L. Granatstein (2007). Physical Principles of Wireless Communications. Taylor & Francis, Inc.
Leo Setian (1997). Practical Communication Antennas With Wireless Applications. Prentice Hall Professional Technical.
David Sumner (1990). The ARRL UHF/Microwave Experimenter's Manual: Antennas, Components and Design . American Radio Relay League, Incorporated.
K. Fujimoto, J. R. James , J.R. James (1994). Mobile Antenna Systems Handbook . Artech House, Incorporated.

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.

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

KOD	KURSUS	KREDIT
EEE 1202	Engineering Application (Laboratory)	2
EEE 1213	Digital Electronics	3
EEE1223	Circuit Theorem I	3
EEE2123	Circuit Theorem II	3
EEE 2113	Microprocessor and Microcomputer	3
EEE 2131	Electrical and Electronic Engineering Laboratory I	1
EEE 2213	Analog Electronic and Devices	3
EEE 2241	Electrical and Electronic Engineering Laboratory II	1
EEE 2223	Measurement and Instrumentation	3
EEE 2233	Signals and Systems	3
EEE2243	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	Communication Theorem	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
EEP4133	Power Electronics	3
EEP 4142	Final Year Project I	2
EEP 4214	Final Year Project II	4
EMT2512	Engineering Mechanics	2

KOD KURSUS	ELEKTIF PROGRAM (9 KREDIT)	KREDIT
EEE 5223	Control System Design	3
EEP 1213	Renewable Energy	3
EEP 1223	Power System Protection	3
EEP 2123	Electrical Condition Monitoring	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 Relations	2	
LAN 1022	Malaysian Studies	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 Theorem II	3	EEE1223 EFA1203
EEE 1223	Circuit Theorem I	3					
JUMLAH		**15**		**JUMLAH**	**JUMLAH**	**13**	

INTER-SESI 1			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**
ALK/PLS 1012	LKU1	2	
DUS1062	Military History	2	
JUMLAH		**4**	

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 and 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 2			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**
ALK/PLS 2012	LKU2	2	
DUS2012	Military Law	2	
JUMLAH		**4**	

SEMESTER 5				SEMESTER 6			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**	**Kod**	**Kursus**	**Kredit**	**Pra-Syarat**
LFL 11X2	Foreign Language I	2		LFL 12X2	Foreign Language II	2	LFL 11X2
EFC 1203	Computing II (Numerical Methods and Engineering Softwares)	3		DUS 2022	Introduction To Strategic Studies	2	
EEE 2241	Electrical and Electronic Engineering Laboratory II	1	EEE 2131	EEE 3141	Electrical and Electronic Engineering Laboratory III	1	EEE 2241
EEE 3112	Introduction to Multimedia Technology & Applications	2		EEE 3113	System Design	3	EEE 2213 EEE 2113
EEE 3123	Analogue Circuit and Systems	3	EEE 2213	EEE 3223	Communication Theorem	3	EEE 2233
EEE 3213	Control Engineering	3	EEE 2233	EEE 3233	Power System	3	EEE 2123
EEE 3113	Electromagnetic Field & Waves	3	EFA2103	EEP 3243	Electrical Machines	3	
JUMLAH		**17**		**JUMLAH**		**17**	

INTER-SESI			
EEE 3314	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**
EEE 4102	Engineering Management	2		EEE 4202	Engineers In Community	2	
EEP 4113	Advanced Power Systems	3	EEE 3233	EEP 4123	High Voltage Technology	3	EEE 3233
EEP 4133	Power Electronics	3	EEE 3233	EEP 4214	Final Year Project II	4	
EEP 4142	Final Year Project I	2	**	EEX 5XX3	Elective II (Power)	3	
EEX 5XX3	Elective (Power)	3		EEX 5XX3	Elective III (Inter-field)	3	
JUMLAH		**3**		**JUMLAH**		**15**	

**Completed 90 Credit Hours

INTER-SESI 4			
Kod	**Kursus**	**Kredit**	**Pra-Syarat**
ALK/PLS 3012	LKU3	2	
DUS 2062	Organisational Leadership	2	
JUMLAH		**4**	

Nota : i. Pelajar Kadet dikehendaki mendaftar kursus Tempur Tanpa Senjata pada setiap semester kedua Tahun 1, 2 dan 3 pengajian.

ii. Pelajar Awam dikehendaki mendaftar mana-mana kursus Ko-kurikulum sebanyak 2 kredit pada mana-mana semester pengajian

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 THEOREM 1

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 THEOREM II

Pre-requisites: EEE 1223 Circuit Theorem 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 Theorem II

This 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 basis of electronic circuit design. Biasing techniques, DC & AC analysis will be discuss thoroughly. 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.
This field will be further discuss in Analog Circuits And Devices in the later years.

References

Boylestad, Robert L. and Nashelsky, Louis (2006). Electronic Devices And Circuit Theory, 9th Edition(International Edition), New Jersey: Pearson. [MAIN REFERENCE]
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
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 Theorem 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 COMMUNICATION THEOREM

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 4203 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.
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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.

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