

COURSE OUTLINE

Department & Faculty: Electrical Engineering	Page : 1 of 4
Course Code: SKEU 2012 ELECTRONICS (ELEKTRONIK)	Semester: 2 Academic Session: 2014/2015
Total Lecture Hours: 42	

Section	Lecturer	Room No.	Contact No.	Email
01/02	Dr. Yeong Che Fai	P19a 0420	07 - 5557163	cfeong@fke.utm.my
03	Dr. Azli Yahya	V01 L - 3 FBME	012 -3837347	azli@fke.utm.my
04/08	Dr. David Ian Forsyth	P08 - 311	07 - 5535316	davidforsyth@fke.utm.my
05/07	Dr. Muhammad Yusof Mohd Noor	P19a 04-03-29	07 - 5557220	yusofnor@fke.utm.my
06	En. Muhammad Ariff Abdul Rahim	VCAD LAB	019 - 7506221	arif@fke.utm.my
SPACE KL	Dr. Mohd Afzan Othman	P08 - 219	07 5535421	afzan@fke.utm.my

Synopsis

: The course introduces students to semiconductor devices, amplifiers and basic concepts in analogue electronic. Course content includes the basic structure of electronic devices, their characteristics and circuit applications. The goal is to develop excellent understanding of the devices operation for students to be applied in analogue and digital circuit design.

LEARNING OUTCOMES

By the end of the course, students should be able to:

No.	Course Learning Outcome	Programme Outcome	Taxonomies and Soft-Skills	Assessment Methods
CLO1	Apply the basic law and theorems of electronic devices to describe their basic operation.	PO1	C2	Q, T, F
CLO2	Apply the basic law, theorems and methods of analysis to solve complex problem related to circuitry.	PO1	C3	T, F
CLO3	Work in a team and communicate effectively.	PO7	A3	As

F = Final Exam ; Q = Quiz ; As = Assignment ; T = Test

<p>Prepared by: Course Coordinator Name: Dr. Zaharah Johari</p> <p>Signature:</p> <p>Date: 9th February 2015</p>	<p>Certified by: Undergraduate Academic Manager Name: Assoc. Prof. Dr. Naziha Ahmad Azli</p> <p>Signature:</p> <p>Date:</p>
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STUDENT LEARNING TIME

Teaching and Learning Activities	Student Learning Time (hours)
1. Direct Learning	(50)
i. Lecture	38
ii. Student-Centered Learning Activities – Active Learning, Cooperative Learning, Tutorial, Post Lecture Discussion	12
2. Self-Learning	(60)
i. Indirect Learning or student-centered learning: Assignment, Project, e-Learning.	24
ii. Revision	18
iii. Assessment Preparation	18
3. Formal Assessment	(10)
i. Continuous Assessment	5
ii. Hourly Test	2.5
iii. Final Examination	2.5
Total (SLT)	120

TEACHING METHODOLOGY

- (i) Lecture, tutorial and in class discussion
- (ii) Individual and Team Quiz, Written Test & Final Examination
- (iii) Active Learning & Cooperative Learning – Team Assignment/Project

ASSESSMENT

Assessment	% Marks
Quizzes (5)	10
Assignment	10
Test 1	15
Test 2	15
Final Exam	50
Total	100

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WEEKLY SCHEDULE

Week 1 (22 Feb - 26 Feb)	Chapter 1: Semiconductor Materials (2 hours) <ul style="list-style-type: none"> Introduction to electronics devices. Atomic structure and material classification. Semiconductor doping and covalent bonding Conduction in semiconductor 	
Week 2 - 3 (1 Mar – 5 Mar)	Chapter 2: Diode: Part 1 (4 hours) <ul style="list-style-type: none"> Introduction to P-N Junction Biasing the PN Junction (Forward and reverse biased) Ideal and practical diode characteristic and circuit analysis. Zener diode characteristics and application as a voltage regulator. 	QUIZ 1
Week 4 - 5 (15 Mar – 26 Mar)	Chapter 3: Rectifier (4 hours) <ul style="list-style-type: none"> Basic blocks of power supplies (line voltage in, step-down transformer, rectifier circuits, filters, voltage regulators and load). Half wave and full wave rectifier. * Focus on full- wave only Full wave rectifier circuit analysis using bridge and center- tap configuration. (Formulas and calculations for the average and rms voltage) Full wave rectifier with filter. Applications of full wave rectifier with capacitor filter and voltage regulator in power supply. (waveform and calculation of voltage at each stage) 	QUIZ 2
Week 6 - 7 (29 Mar – 2 Apr)	Chapter 4: Bipolar Junction Transistor (BJT) (4 hours) Part 1 : DC Analysis (2 hour) <ul style="list-style-type: none"> Introduction to Bipolar Junction Transistor (BJT). BJT basic operation, configuration, current relation and operational region. * Focus on Common Emitter configuration (Fixed bias, Emitter bias, Voltage divider bias) BJT as amplifier. Design and analysis of biasing circuit, DC load line and Q- point using graphical approach. Part 2 : AC Analysis (2 hours) <ul style="list-style-type: none"> Mid frequency AC analysis using hybrid – π model *Common Emitter with and without by-pass capacitor Amplifier parameters ($AV_{(OC)}$, Av, Zi and Zo). 	TEST 1 : 1ST April 2015 CHAPTER 1 - 3 QUIZ 3
Week 8	MID- SEMESTER BREAK (5 April-9 April 2015)	
Week 9 - 10 (12 Apr – 23 Apr)	Chapter 5: Metal Oxide Semiconductor Field Effect Transistor (MOSFET) Part 1 : DC Analysis (4 hours) <ul style="list-style-type: none"> Introduction to MOSFET MOSFET basic operation, configuration, current relation and operational region. MOSFET as amplifier DC load line and Q point using graphical approach. <p>*Focus on Common Source configuration (Fixed bias, Voltage divider bias)</p>	

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Week 11 - 12 (26 Apr – 30 Apr)	Chapter 5: Metal Oxide Semiconductor Field Effect Transistor (MOSFET) Part 2 : AC Analysis (4 hours) <ul style="list-style-type: none"> • Mid frequency AC analysis using hybrid – π model • *Common Source with and without by-pass capacitor • Amplifier parameters ($A_{V(OC)}$, A_v, Z_i and Z_o). • Simulation using Multism <p>* Focus on Common Source configuration (Fixed bias, Voltage divider bias)</p>	QUIZ 4
Week 13 - 14 (3 May – 14 May)	Chapter 6: Operational Amplifiers (Op Amps) (4 hours) <ul style="list-style-type: none"> • Op – Amp characteristic • Linear: Inverting and non – inverting amplifiers, voltage follower, inverting and non – inverting summing and instrumentation amplifier. • Non-Linear: Comparator and Schmitt Trigger 	TEST 2 11TH MAY 2015 CHAPTER 4 – 5 QUIZ 5
Week 15 (17 May - 21 May)	Chapter 7: Electronic Circuit Application (2 hours) Oscillator (Wien Bridge), Multivibrator (Astable) and 555 Timer	
Week 16	Study Week	
Weeks 17-18	Revision Week and Final Examination	
REFERENCES	1. Thomas L. Floyd, Electronic Devices, 9 th Edition, Prentice Hall, New Jersey, 2008. 2. Rubita Sudirman, Puspa Inayat Khalid, Siti Hawa Ruslan, Peranti Elektronik, Pearson Education, 2007 3. Rubita Sudirman, Puspa Inayat Khalid, Siti Hawa Ruslan, Modul Pengajaran Elektronik 1, Edisi ke-3, 2001 4. Neamen, Donald. A., Microelectronics - Circuit Analysis and Design, 3 rd Ed., McGraw Hill, Int. Ed. 2007. 5. Robert. Paynter, Introductory Electronic Devices and Circuits, 7 th Edition Prentice Hall, New Jersey, 2006. 6. Boylestad and Nashelsky, Electronic Devices and Circuit Theory, 11 th Edition Prentice Hall, New Jersey, 20013.	