

COURSE OUTLINE

Department & Faculty: Electrical Engineering	Page: 1 of 4
Course Code: SKEU 2253 ELECTRONIC CIRCUITS (LITAR ELEKTRONIK) Total Lecture Hours: 42	Semester: 2 Academic Session: 2016/2017

LECTURER

Name	Sec.	Email
Dr. Nurzal Effiyana Ghazali/ Dr. Muhammad Al Farabi Muhammad Iqbal	01	alfarabi@utm.my/ nurzal@utm.my

SYNOPSIS

: The course introduces students to some key topics in analogue electronics. Students will be exposed to electronic devices, their behaviours and circuit applications. Analysis on DC and AC circuits will also be conducted. The course covers topics on semiconductor devices, p-n junction, diode, Zener diode, rectifier, transistors (BJT and MOSFET), operational amplifiers and 555 Timer.

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
C01	Apply the basic law and theorems of electronics devices to describe their basic operation	PO1	C2	Q, T
CO2	Apply the basic law, theorem, and method of analysis to solve complex problems related to circuitry with diode, BJT, FET, op-amp and 555 Timer components	P01	C3	F
CO3	Work in a team and communicate effectively	P07	A3	As

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

Prepared by: Course Coordinator

Certified by: Head of Department (ECE)

Name: Dr. Zaharah Johari

Name: PM. Dr. Norlaili Mat Safri

Signature:

Signature:

Date: 4th February 2017

Date:

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STUDENT LEARNING TIME

Teaching and Learning Activities	Student Learning Time (hours)
1. Direct Learning	
i. Lecture	42
ii. Tutorial/Post Lecture Discussion	13
2. Self Learning	
i. Indirect Learning/Assignment	22
ii. Group Discussion	6
iii. Revision	12
iv. Quizzes, Tests and Final Exam Preparation	18
3. Formal Assessment	
i. Continuous Assessment	2
ii. Hourly Test	2
iii. Final Examination	3
Total	120

ASSESSMENTS:

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

REFERENCES

1. Thomas L. Floyd, Electronic Devices, 9th 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, 3rd Ed., McGraw Hill, Int. Ed. 2007.
5. Robert. Paynter, Introductory Electronic Devices and Circuits, 7th Edition Prentice Hall, New Jersey, 2006.
6. Boylestad and Nashelsky, Electronic Devices and Circuit Theory, 11th Edition Prentice Hall, New Jersey, 2013.

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WEEKLY SCHEDULE		
Week 1 (12 Feb – 16 Feb)	Chapter 1: Semiconductor Materials (3 hours) <ul style="list-style-type: none"> Introduction to electronic devices Atomic structure and material classification Semiconductor doping and covalent bonding Silicon (Si) and Germanium (Ge) structure Current conduction in material 	
Week 2 - 3 (19 Feb – 2 Mar)	Chapter 2: Diodes (6 hours) <ul style="list-style-type: none"> Introduction to p-n junction I-V Characteristic and biasing the p-n junction Diode resistance and diode model Ideal and practical diode characteristic and circuit analysis Diode applications: DC power supply , clipper, analysis & design of rectifier with capacitor filter The Zener diode: characteristics and application as a voltage regulator 	QUIZ 1
Week 4 - 5 (5 Mar – 16 Mar)	Chapter 3: Rectifier (6 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 : full – wave only) Full wave rectifier circuit analysis using bridge and center- tap configuration. (Formulas and calculations for the average, rms voltage and PIV). 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 (19 Mar – 30 Mar)	Chapter 4: Introduction to Transistor Part 1: DC Analysis (3 hours) <ul style="list-style-type: none"> Introduction to PNP and NPN Transistor Transistor as small signal amplifier and switch Introduction to bipolar junction transistor (BJT) BJT basic operation, configuration, current relation and operational region. (*Focus : 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 (3 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 (g_m, r_{π}, $A_{V(OC)}$, A_V, Z_i and Z_o) 	TEST 1 : COVERS CHAPTER 1 – 3 29 Mar 17

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WEEK 8	MID SEMESTER BREAK (31 Mar – 8 April 2017)	
Week 9 - 10 (9 Apr – 20 Apr)	<p>Chapter 5: Metal Oxide Semiconductor Field Effect Transistor (MOSFET)</p> <p>Part 1: DC Analysis (6 hours)</p> <ul style="list-style-type: none"> • Introduction to MOSFET (Focus on Enhancement MOSFET Only) • Design and analysis of MOSFET biasing circuit • E- MOSFET basic operation, configuration, current relation and operational region • E- MOSFET as amplifier DC load line and Q point using graphical approach <p>(*Focus : Common Source configuration - fixed bias, voltage divider bias)</p>	QUIZ 3
Week 11 - 12 (23 Apr – 4 May)	<p>Part 2: AC Analysis (6 hours)</p> <ul style="list-style-type: none"> • MOSFET as small signal amplifier. • Small signal analysis using hybrid-π calculation of g_m, $A_{v(OC)}$, A_v, Z_i and Z_o. • Simulation using Multism • Sketch the output waveform. <p>(*Focus : Common Source configuration - fixed bias, voltage divider bias)</p> <p>Part 3: MOSFET as Switches</p> <ul style="list-style-type: none"> • Introduction to Complementary Metal Oxide Semiconductor • Basic gate circuits. 	QUIZ 4
Week 13 - 14 (7 May – 18 May)	<p>Chapter 6: Operational Amplifiers (6 hours)</p> <ul style="list-style-type: none"> • Op – Amp characteristic • Linear: Inverting Amp, Non-Inverting Amp, Summing Amp, Buffer (Voltage Follower), Differentiator, and Integrator • Non-Linear: Comparator and Schmitt Trigger 	TEST 2 COVERS CHAPTER 4 – 5 18 May 17
Week 15 (21 May – 25 May)	<p>Chapter 7: Electronic Circuit Application (3 hours)</p> <ul style="list-style-type: none"> • Oscillator (Wien Bridge) using Op-Amp. Multivibrator (Astable) and Monostable using 555 Timer include design. 	QUIZ 5
Week 16	Revision Week (Study Week (26 May – 3 June 2017))	
Weeks 17-18	Study Week & Final Examination (4 June – 22 June 2017)	