

University of Macau
Faculty of Science and Technology
Department of Electrical and Electronics Engineering

Part A: Course Outline

Course Title:	Circuit Analysis		
Course Code:	ELEC231	Year of Study:	1
Compulsory/Elective:	Compulsory		
Course Mode:	Theoretical with substantial laboratory/ practice content		
Course Prerequisites:	None		
Prerequisite Knowledge	differential equations and Calculus		
Class/Laboratory Schedule:	3-hour lecturer, and 2-hour tutorial and/or laboratory per week		
Duration	One semester	Credit Units	3.5
Text Books and References:	Introduction to Electric Circuits 5 th Edition, Richard C. Dorf and James A. Svoboda, John Wiley & Sons, Inc. 2001		
Course Description:	Circuit Analysis deals with the fundamental knowledge in solving electronic circuits with ideal and non-ideal practice components. The involved skill and knowledge are the foundations of many advanced electronics courses.		
Topics Covered	1. Elementary Resistive Circuit Theorems and Analysis Techniques: KCL, KVL, Nodal & Mesh Analysis and their Matrix formulation, Superposition, Source Transformation, Thevenin & Norton Equivalent, Maximum Power Transfer. Ideal OP AMP Model and its Circuit Analysis Methods. Energy Storage Elements, 1 st - and 2 nd -Order Circuit Analysis: Natural, Forced and Completed Response. Sinusoidal Steady-State Analysis: Phasor, Impedance and Admittance.		
Course Objectives:	1. To educate students fundamental circuit analysis skills [a, e, k] 2. To introduce students the basic electronics utilized in the industry and how to link up the theory with practice [a, e, k] 3. To offer students laboratory hand-on experience on building and measuring electronics circuits [a, b, c, d, e, k]		
Course Assessment:	Quiz :20% Laboratories: 15% Mid-term Exam. : 25% Final Exam. : 40%		
Relationship to Program Objectives and Outcomes	This course primarily contributes to EEE program outcomes that develop students abilities to: a. Ability to apply knowledge of mathematics, science and engineering. e. Ability to identify, formulate and solve engineering problems. k. Ability to use the techniques, skills and modern engineering tools necessary		

	<p>for engineering practice.</p> <p>This course secondarily contributes to EEE program outcomes that develop students abilities to:</p> <p>b. Ability to design and conduct experiments.</p> <p>c. Ability to design a system, component or process to meet desired needs.</p> <p>d. Ability to function on multidisciplinary teams.</p>		
Course Contents and Relationship to Program Criteria:			
	Week no.	Topics	Program Criteria
	3	Introduction and Basic Circuit Analysis with Ideal Elements Brief history of electronics, Elementary Resistive Circuit Theorems and Analysis Techniques: KCL, KVL, Nodal & Mesh Analysis and their Matrix formulation	ES
	2	Advanced Circuit Analysis with Ideal Elements Superposition, Source Transformation, Thevenin & Norton Equivalents, Maximum Power Transfer	DIC, ES
	4	Circuit Analysis with Practical Active and Passive Components Practical OPAMP Model and its Circuit Analysis Methods. Energy Storage Elements: Capacitors and Inductors, Laboratories on OPAMP based circuit such as inverting amplifier	ES, CS, DE
	3	1st and 2nd Order Circuit Analysis Natural, Forced and Completed Response of circuits	ES, DE
	2	Sinusoidal Steady-State Analysis Phasor, Impedance and Admittance for solving high-order circuits	DE, CV
Contribution of Course to meet the professional component:	This course educates students with circuit analysis skills related with wide kinds of electronic circuits. Students should be able to link up the basic circuit theories to practical applications and apply knowledge of mathematics and engineering, identify formulas, build up hardware to test and verify electronic circuits.		
Course Instructor(s):	Prof. Pui-In Mak		
Prepared by:	Prof. Pui-In Mak		

Part B: General Course Information and Policies

Instructor: Dr. Pui-In Mak

Office: JLG211B

Office Hour: Thursday 3:30~5:30 p.m. or by appointment Phone: 8794

e-mail: pimak@umac.mo

Program Criteria Policy:

Course VS Program Criteria

Scale: 1 (Highest) to 4 (Lowest)

Course	PS	DIC	BS	CS	ES	DE	LA	CV	DM
Circuit Analysis		2		3	1	3		4	

Terms:

Probability and Statistics (PS), Differential and Integral Calculus (DIC), Basic Science (BS), Computer Science (CS), Engineering Science (ES), Differential Equation (DE), Linear Algebra (LA), Complex Variables (CV), Discrete Mathematics (DM)

Program Outcome Policy:

Course VS Course Outcomes

(H= Highly Related, S = Supportive, N = None)

Course	a	b	c	d	e	f	g	h	i	j	k
Circuit Analysis	H	S	S	S	H	N	N	S	N	N	S

The electrical and electronics engineering program outcomes are:

- Ability to apply knowledge of mathematics, science and engineering.
- Ability to design and conduct experiments.
- Ability to design a system, component or process to meet desired needs.
- Ability to function on multidisciplinary teams.
- Ability to identify, formulate and solve engineering problems.
- Understanding of professional and ethical responsibility.
- Ability to communicate effectively.
- Broad education necessary to understand the impact of engineering solutions in global and societal context.
- Recognition of the need for and an ability to engage in life-long learning.
- Knowledge of contemporary issues.
- Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Curriculum Detail

ELEC 231 Circuit Analysis

Timetabled work in hours per week			No of teaching weeks	Total hours	No /Duration of exam papers	Max marks available from:	
Lecturer	Tutor	Practice				Exams	Course
3	0	2	14	70	2/5 hours	50	50

Term: 5th

Hours			Percentage content of					
Lecturer	Lab/tut	Other	Maths	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies
42	28	0	20	10	50	20	0	0

Design Elements

% of Design Content	Design Content in Course Work	Design Project	Design Content in Laboratories
10%	X	X	X

Course Assessment Policy:

- Homework assignments will be given to students according to the course progress, no late homework is accepted. Zero mark will be given when homework is copied.
- 3-4 Quizzes will be held during the semester.
- 1-2 laboratories will be performed during the semester. 2-3 students form one group and group report should be handed up.
- 1 mid-term exam and 1 final exam will be performed with 2 hours and 3 hours respectively.