City University of Hong Kong
Course Syllabus

offered by Department of Electrical Engineering
with effect from Semester B in 2020/2021

Part I Course Overview

Course Title:	Analogue Electronic Circuits
Course Code:	EE3110
Course Duration:	One Semester (13 weeks)
Credit Units:	3
Level:	B3
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	EE2301 Basic Electronic Circuits or EE2005 Electronic Devices and Circuits
Co-requisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	EE2109 Electronic Circuits
Equivalent Courses: *(Course Code and Title)*	EE3122 Analogue Circuit Fundamentals
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

The aims of the course are to present the techniques used in the analysis of analogue circuits and to apply them to a spectrum of different uses.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs#	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Identify, differentiate and analyze the frequency effects of amplifiers			√	
2.	Identify, differentiate and construct the equivalent model/circuit of feedback amplifiers			√	
3.	Analyze using circuit/feedback theory the performance of feedback amplifiers			√	
4.	Assess and apply feedback/circuit analysis to amplifiers and oscillators		√	√	
5.	Evaluate and apply feedback to amplifiers and oscillators		√	√	
6.	Identify different techniques used in monolithic circuits			√	
	** If weighting is assigned to CILOs, they should add up to 100%.*	100%			

 # Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4	5	6	
Lecture	Lectures are given on the basic principles followed by examples to demonstrate it application.	√	√	√	√	√	√	2 hrs/wk
Tutorial	Problems are carried out by asking students how to do each	√	√	√	√	√	√	1 hr/wk

	step.							
Laboratory/Mini-project	Enables students to put into practice what they learnt in class. Students will have a structured laboratory session followed by a practical design problem.	√	√	√		√		3 hrs/wk (3 weeks lab)
Laboratory self-practice	Students who have not been able to follow the assigned schedule will be given time to complete each session to allow them to continue with the next part.	√	√	√		√		3 hrs/wk (3 weeks lab)

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4	5	6		
Continuous Assessment: 60%								
Tests (min.: 2)	✓	✓	✓	✓	✓		40%	
#Assignments (min.: 3)	✓	✓	✓	✓	✓	✓	5%	
Lab Exercises/Reports	✓	✓	✓		✓		15%	
Examination: 40% (duration: 2 hrs, if applicable)								
Examination	✓	✓	✓	✓	✓	✓	40%	
** The weightings should add up to 100%.*							100%	

Remark:

To pass the course, students are required to achieve at least 30% in course work and 30% in the examination. Also, 75% laboratory attendance rate must be obtained.

may include homework, tutorial exercise, project/mini-project, presentation

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Examination	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Coursework	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels

6. Constructive Alignment with Major Outcomes

MILO	How the course contribute to the specific MILO(s)
1, 2, 5	The application of mathematics, science and engineering is central to the aims of this course with ample opportunity to apply these applications to the solution of engineering problems in class and in the laboratory.
4. 7. 10	A three 3 hour long session laboratory is scheduled to allow students to carry out a mini-project which is directly linked to the theory learnt during the lecture. Students will be grouped into 3-5 and given a chance to practice the use of engineering tools in their analysis and their communication skills in report writing and demonstrations.

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

Revision on Transistor Circuits Modeling
Modeling of BJTs and FETs, construction and analysis of small signal ac equivalent circuits; switching characteristic; different types of BJT and FET

Frequency Response of Amplifiers
Low frequency response: coupling and bypass capacitors. Mid-frequency response. High frequency response.

Feedback Amplifiers
Ideal feedback amplifiers: gain stability, signal-noise ratio, effects on gain and bandwidth, types of feedback amplifiers, effects on input and output impedance. Practical feedback amplifiers: voltage amplifier, transadmittance amplifier, transimpedance amplifier, current amplifier, prediction of stability, frequency response.

Oscillators
Oscillation conditions: Barkhausen criterion, loop gain, phase shift, Oscillator circuits: Wein bridge, phase shift, Colpitts, Pierce, Hartley, piezoelectric crystal oscillators.

Monolithic Circuit Techniques
Current sources: simple current source, Widlar and Wilson current source, matching considerations in transistor current sources. Active loads: current sources as active loads, common-emitter and differential amplifiers with active loads. Output stages: biasing, Darlington, push-pull, current limiter.

Laboratory/Mini-project Experiment:
Students will form groups with size 3-5 to achieve a mini-project with progressing complexity. They need to apply problem solving skill with the concepts learnt to fulfill the given goal through team works.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	N/A

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Muhammad H. Rashid: Microelectronic Circuits: Analysis and Design, (PWS Publishing Company, 1999)
2.	Jacob Millman, Christos C. Halkias and Satyabrata Jit: Millman's Electronic Devices and Circuits, (Tata McGraw Hill, second edition 2007)
3.	Donald A. Neaman: Microelectronics: Circuit Analysis and Design, (McGraw-Hill, third edition 2007)