EE2109: ELECTRONIC CIRCUITS

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Electronic Circuits

Subject Code
EE - Electrical Engineering
Course Number
2109

Academic Unit
Electrical Engineering (EE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
EE2005 Electronic Devices and Circuits or EE2301 Basic Electronic Circuit or MBE2029 Electrical and Electronic Principles I

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

The aim of this course is to provide students with more in-depth analytical techniques used for solving linear circuits, and principles and concepts of some commonly used semiconductor devices.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Apply operational amplifiers to more complex circuit		x	x	
2	Apply and analyze the transient response of RLC circuits		x	x	
3	Analyze regulating circuits		x	x	
4	Analyze linear circuits by transformation into two-ports equivalent networks		x	x	
5	Apply analytical methods to solve for small signal amplifying circuit		x	x	

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 real-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.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture and Tutorial	Lectures aims to explain and illustrate the key concepts involved in this courses; Tutorial aims to help students in familiar with those concepts though practicing some in-class exercise	1, 2, 3, 4, 5	4 hrs/wk(3 hrs Lect, 1 hr Tut)
2	Laboratory	Conduct experiments to deepen the key concepts learnt during lectures	1, 2, 3, 4, 5	3 hrs/wk (7 weeks)

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tests (min.: 2)	1, 2, 3, 4, 5	30	
2	#Assignments (min.: 3)	1, 2, 3, 4, 5	10	
3	Lab Exercises/Reports	1, 2, 3, 4, 5	10	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Additional Information for ATs

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

Assessment Rubrics (AR)

Assessment Task

Examination

Criterion

Achievement in CILOs

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Coursework

Criterion

Achievement in CILOs

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Operational Amplifiers
Revision of Ideal Operation Amplifier; Practical Considerations: common mode rejection ratio, frequency response and compensation; Applications of Operational Amplifiers.

Active Filters
Design of RC active filter circuits: low-pass, high-pass, band-pass, band-stop, all-pass, notch filters.

First-and Second-Order Circuits
Discontinuous functions. Formulation of integro-differential equations of linear networks composed of RLC. Source-free and step response of RC and RL circuits. Initial and final values. Source-free and step response of series and parallel RLC circuits.

Regulators
Zenar diode; Power Regulators: Shunt and series regulators, switching regulators. Practical issues: Protection circuits, heat dissipation, efficiency.

Two-Port Networks
Impedance parameters. Admittance parameters. Hybrid parameters. Transmission parameters. Interconnection of networks. The reciprocity theorem.

Small-Signal Analysis of Amplifying Circuits
AC equivalent circuits. h-parameter model. re model. Analysis of various configurations, voltage and current gain, input and output impedance.

Low and High Frequency Response of Amplifying Circuits
Basic frequency response of the BJT amplifying circuits.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Giorgio Rizzoni, Fundamentals of Electrical Engineering, (McGraw-Hill Higher Education).
2	Donald A. Neaman: Microelectronics: Circuit Analysis and Design, (McGraw-Hill, third edition 2007).
3	Muhammad H. Rashid: Microelectronic Circuits: Analysis and Design, (PWS Publishing Company, 1999).

4	Jacob Millman, Christos C. Halkias and Satyabrata Jit: Millman’ s Electronic Devices and Circuits, (Tata McGraw Hill, second edition 2007).