EE2301: BASIC ELECTRONIC CIRCUITS

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Basic Electronic Circuits

Subject Code
EE - Electrical Engineering
Course Number
2301

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
Nil

Precursors
Nil

Equivalent Courses
EE2005 Electronic Devices and Circuits

Exclusive Courses
Nil

Part II Course Details

Abstract

The aim of this course is to provide students with the basic principles of electronic circuits and devices for analysing simple circuits, and the characteristics of some commonly used electronic devices.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Apply basic circuit theorems to analyse DC electrical circuits		x	x	
2	Apply basic circuit theorems to analyse AC electrical circuits		x	x	
3	Describe the basic characteristics, operations and applications of some basic electronic devices (including diodes and transistors)		x	x	
4	Apply operational amplifier to basic circuit design		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	Lectures	Key concepts are described and illustrated	1, 2, 3, 4	3 hrs/wk
2	Tutorials	Key concepts are worked out based on problems	1, 2, 3, 4	1hr/wk
3	Labs	Key concepts are applied to build practical circuits	1, 2, 3, 4	3 hrs/wk (5 weeks)

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tests (min.: 2)	1, 2, 3, 4	30	
2	#Assignments (min.: 3)	1, 2, 3, 4	5	
3	Lab Exercises/reports	1, 2, 3, 4	15	

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
Achieving all CILOs

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Margin

Failure (F)
Not even reaching marginal

Assessment Task
Coursework

Criterion
Achieving all CILOs

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Margin

Failure (F)

Not even reaching marginal

Part III Other Information

Keyword Syllabus

Reviews : electric properties; electric fields; magnetism;

Basic concepts : Ideal voltage and current sources; independent and dependent sources; Nodes, branches, loops and meshes; Charge and current; Kirchhorff' s current law; Voltage; Kirchhorff' s voltage law; Power and Energy; passive sign convention; Circuit elements; resistor, open- and short- circuit; ohm's law; Series resistors and voltage division; Parallel resistors and current division.

Circuit analysis : Mesh and nodal analysis. Superposition. Source transformation. Thevenin's theorem. Norton's theorem. Maximum power transfer.

AC Circuits: Capacitor and inductor; Sinusoids and phasor; Complex impedance and admittance; Resonance; Instantaneous and average power.

Diode Circuits: Operation Principles; Current-voltage characteristics. Load line concepts. Circuit models for the semiconductor diode; Ideal diode model and offset diode model; Application of diode: rectifier.

Transistors: BJT and FET; Operation Principles; Operation Modes; Applications.

Operational Amplifiers : Characteristics of the ideal amplifiers; Operational amplifier; open loop mode, closed loop mode; Inverting amplifier, non-inverting amplifier, summing amplifier, differential amplifier.

Reading List

Compulsory Readings

	Title
1	Charles K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, (McGraw-Hill Higher Education 2013)

Additional Readings

	Title
1	Nil