

EE2005: ELECTRONIC DEVICES AND CIRCUITS

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Electronic Devices and Circuits

Subject Code

EE - Electrical Engineering

Course Number

2005

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

EE1002 Principles of Electrical Engineering

Equivalent Courses

EE2301 Basic Electronic 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 analyzing simple circuits, and the characteristics of some commonly used electronic devices.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)			
1	Apply the essential skills in analysing AC and AC circuits		x	x	
2	Apply the concepts of transient and frequency responses of dynamic circuits		x	x	
3	Construct and apply ideal operational amplifier circuits		x	x	
4	Describe the basic characteristics, operations and applications of some basic electronic devices (including diodes and transistors)		x	x	
5	Apply basic techniques for effective analysis of electronic circuits		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 Key concepts are worked out based on problems	1, 2, 3, 4, 5 3 hrs/wk
2	Labs/Practice Classes	Key concepts are applied to build practical circuits and essential skills to be mastered by practice	1, 2, 3, 4, 5 3 hrs/wk (4-7 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 and 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

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

Circuit Analysis

DC circuits; review of systematic circuit analysis; AC circuits; transient and steady-state solutions; introduction to frequency response.

Operational Amplifier Circuits

Ideal operational amplifier; inverting amplifier, non-inverting amplifier, summing amplifier, differential amplifier, instrumentation amp.

Passive and Active Filters

Passive filter circuits; RC active filter circuits: low-pass, high-pass, band-pass, band-stop, all-pass, notch filters.

Diode Circuits

PN junction; diode characteristics and models; ideal diode model and offset diode model; load line and operating point; Zener diode; Applications: rectifier and clamping circuits.

Transistor Circuits

Operating principles of BJT/MOSFET devices; input and output characteristics; transistor biasing and active operating points; different types of single-stage amplifiers; small-signal analysis of amplifying circuits; input and output resistances; AC voltage gain.

Reading List

Compulsory Readings

Title	
1	C. K. Alexander and M. N. O. Sadiku, Fundamentals of Electric Circuits, 6th Edition, (McGraw-Hill Higher Education 2016)
2	Donald Neamen, Microelectronics Circuit Analysis & Design, 4th Edition, (McGraw Hill 2009)

Additional Readings

Title	
1	W. Hayt, J. Kemmerly, J. Philips and S. Durbin, Engineering Circuit Analysis, 9th Edition, (McGraw-Hill Higher Education 2018)
2	C. K. Tse, Linear Circuit Analysis, (Addison-Wesley and Pearson Education, 1998)