EE2005: ELECTRONIC DEVICES AND CIRCUITS

Effective Term
Semester A 2024/25

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 app.)	DEC-A1	DEC-A2	DEC-A3
1	Apply the essential skills in analysing AC and AC circuits		x	x	
2	Construct and apply ideal operational amplifier circuits		x	x	
3	Describe the basic characteristics, operations and applications of some basic electronic devices (including diodes and transistors)		x	x	
4	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.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students will participate in lectures where they will learn various fundamental knowledge and concepts in simple electronic systems, which they will apply in subsequent activities to deepen their understanding and practical skills.	1, 2, 3, 4	3 hrs/wk
2	Labs/Practice Classes	Students will engage in lab sessions designed to reinforce key concepts covered in lectures and tutorials, enabling them to apply theoretical knowledge through hands-on practice and collaborative problem-solving.	1, 2, 3, 4	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	30	
2	#Assignments (min.: 3)	1, 2, 3, 4	10	
3	Lab Exercises and Reports	1, 2, 3, 4	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; passive filter circuits.

Operational Amplifier Circuits
Ideal operational amplifier; inverting amplifier, non-inverting amplifier, summing amplifier; differential amplifier, instrumentation amp; RC active filter circuits: low-pass, high-pass, band-pass.

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, 7th Edition, (McGraw-Hill Higher Education 2020)
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)