

# BME2029: ELECTRICAL AND ELECTRONIC PRINCIPLES

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## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Electrical and Electronic Principles

### Subject Code

BME - Biomedical Engineering

### Course Number

2029

### Academic Unit

Biomedical Engineering (BME)

### College/School

College of Biomedicine (BD)

### 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

Nil

### Exclusive Courses

Nil

### Additional Information

# It is desirable that students have done some courses in A-level Mathematics with knowledge of differential equations, algebra, complex numbers, etc.

## Part II Course Details

### Abstract

This course covers the fundamental concepts, general background and practical knowledge of electrical and electronic engineering at a level appropriate for biomedical engineering, mechanical engineering and manufacturing engineering students. The course aims to present the principles of electrical and electronic engineering with practical applications. Furthermore, this course also aims to equip students with analysis skills of various circuits and design skills of some simple circuits, and thus enable students to develop skills in solving practical problems of electrical and electronic engineering.

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe basic circuit laws, such as Ohm's law, Kirchhoff's current law, Kirchoff' s voltage law and working principles of basic building blocks of electronic devices (diode, transistor, amplifier).	x	x	
2	Explain and solve transient/steady-state responses.		x	
3	Apply various analytical methods to solve DC circuit problems.		x	
4	Solve electronic circuit problems such as rectifier circuits, wave-shaping circuits, filter circuits and amplifier circuits.		x	x
5	Design simple filters and amplifiers.			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	Lecture	Students will develop the understanding of key concepts and basic knowledge.	1, 2, 3, 4, 5	3 hrs/week
2	Laboratory Work	Students will apply the learned knowledge to conduct hands-on experiment.	2, 3, 5	3 hrs/week for 2 weeks

### Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Midterm Test/Quiz	1, 2, 3, 4	30	-	No
2	Laboratory Reports	2, 3, 5	10	2 reports to be submitted	Yes

**Continuous Assessment (%)**

40

**Examination (%)**

60

**Examination Duration (Hours)**

2

**Minimum Continuous Assessment Passing Requirement (%)**

30

**Minimum Examination Passing Requirement (%)**

30

**Assessment Rubrics (AR)****Assessment Task**

Midterm Test/Quiz

**Criterion**

Ability to grasp fundamental knowledge related with the electric circuit.

**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**

Laboratory Reports

**Criterion**

Ability to design experiment, conduct proper measurement by applying the learned knowledge to specific problems, and perform data analysis.

**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

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**Assessment Task**

Examination

**Criterion**

Ability to understand basic concepts related with the DC and AC circuit as well as electronics.

**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

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## Part III Other Information

**Keyword Syllabus**

Electric laws and resistive circuits; Circuit analysis; Inductance and capacitance; Transients analysis; Steady-state sinusoidal analysis and phasors; Filters, frequency response, and resonance; Diodes and applications; Bipolar junction transistors (Working principle, Large signal analysis, Emitter Follower); Specifications and external characteristics of amplifiers; Operational amplifiers and applications (Working principles, Gain calculation); Transformers

**Reading List**

**Compulsory Readings**

Title	
1	A.R. Hambley, Electrical Engineering, Principles and Applications, Prentice Hall, 7th Edition, 2019. ISBN13: 978-1292223124.

**Additional Readings**

<b>Title</b>	
1	G. Rizzoni and J. Kearns, Principles and Applications of Electrical Engineering, McGraw Hill, 6th Edition, 2016.
2	R. C. Dorf and J. A. Svoboda, Electric Circuits, John Wiley & Sons, Inc., 9th Edition, 2014.
3	Other relevant books or literatures may be chosen by students for self-teaching, writing the lab reports and assignments.