

Course Code MH361 **Course Name** Electronics 2

Pre-Requisite MH571 **Course Type** Major Elective

Year of Study 4th/8th Level of Course BSc/1st Cycle ECTS Credit 7.5

Language of Instruction English

Mode of Delivery On Campus

Course Objectives:

The main objectives of the course are to:

- Introduce general single and multistage amplifier concepts.
- Provide a solid knowledge and high frequencies as well as small-signal JFET amplifiers.
- Enable students to analyze and design single and multistage transistor amplifiers for analog applications.
- Explain the concept and function of the operational amplifier and its applications.
- Develop skills for troubleshooting and simulating the dc and ac operation of fundamental electronic circuits.

Learning Outcomes:

After completion of the course students are expected to:

• Analyze single and multistage BJT amplifier circuits with respect to various parameters such as dc biasing and Q-point stability, small-signal gains, input impedance, output impedance and loading effects.

- Derive expressions relating amplifier parameters based on various small-signal transistor models.
- Design single and multistage amplifiers that satisfy certain specifications.
- Perform frequency analysis of BJT amplifiers.
- Analyze basic JFET amplifiers.
- Explain and analyze ideal operational amplifier circuits.
- Utilize software to analyze the dc and small-signal operation of amplifier circuits.

Teaching Methodology:

Lectures 42 hours

Labs 30 hours

Course Content

• Introduction to the fundamentals of ac amplifiers: voltage and current gains, input and output resistances, source and load resistances, dc biasing, coupling capacitors

• Small-signal BJT amplifiers in common base, common emitter, common collector configurations. Small-signal parameters, re and h-parameter transistor models, equivalent circuits, derivations of relevant equations, effects of ac load resistance, ac load line, Q-point stability, characteristics of each configuration and application circuits

• Multistage amplifier theory, capacitor and direct-coupled BJT amplifiers, the Darlington pair

• Frequency response (gain and phase) of amplifiers. Bode plots, series capacitance and low-frequency response, shunt capacitance and high frequency response, derivations, BJT amplifier frequency response, Miller theorem, cascode amplifier

• Small-signal JFET parameters, common-source and common-drain small-signal JFET amplifiers

• Ideal operational amplifier theory and application circuits, inverting and noninverting amplifiers, summing and difference amplifiers, voltage follower, integrator and differentiator circuits, oscillators, Barkhausen criterion, voltage comparators, hysteresis and Schmitt triggers

Assessment Methods:

Final Exam

Mid-term/Lab Exam

Required Textbooks/Reading:

Title	Author(s)	Publisher	Year
Electronic Devices and Circuit Theory	Robert Boylestad	Pearson Education	2009
	Louis Nashelsky		
Electronic Devices and Circuits	Theodore F. Bogart	Prentice Hall	2004
	Jeffrey S. Beasley		
	Guillermo Rico		