



Course Code ECE-212	Course Title Electronics II	ECTS Credits 6
Department Engineering	Semester Fall, Spring	Prerequisites ECE-210
Type of Course Required	Field Engineering	Language of Instruction English
Level of Course 1 st Cycle	Year of Study 2 nd	Lecturer(s) Dr Andreas Michaelides
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

The main objectives of the course are to:

- Introduce general single and multistage amplifier concepts.
- Provide a solid knowledge and understanding of small-signal BJT amplifiers in low, mid-band 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.

Course Contents:

- 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, r_e 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 non-inverting amplifiers, summing and difference amplifiers, voltage follower, integrator and differentiator circuits, oscillators, Barkhausen criterion, voltage comparators, hysteresis and Schmitt triggers

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises.

Assessment Methods:

Homework, exams, final exam.

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Robert Boylestad Louis Nashelsky	Electronic Devices and Circuit Theory	Pearson Education	2009	0136064639

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Theodore F. Bogart Jeffrey S. Beasley Guillermo Rico	Electronic Devices and Circuits	Prentice Hall	2004	0131111426