AMERICAN UNIVERSITY
OF CYPRUS

Course Code MH351	**Course Name** Electronics 1	**ECTS Credit** 7.5
Pre-Requisite CS102	**Course Type** Major Elective	**Language of Instruction** English
Year of Study 3rd /5th	**Level of Course** BSc/1st Cycle	**Mode of Delivery** On Campus

Course Objectives:

The main objectives of the course are to:

• Provide students with a basic background on semiconductor materials and semiconductor physics.

• Introduce the characteristics and operation of electronic devices such as p-n junctions, bipolar-junction transistors and field-effect transistors.

• To analyze and design electronic circuits involving diodes, BJT, JFET and MOSFET.

• Apply electronic circuits for common devices such as rectifiers, power supplies, stabilizers, logic gates and others.

• Develop skills for troubleshooting and simulating electronic circuits.

Learning Outcomes:

After completion of the course students are expected to:

• Comprehend basic semiconductor theory.

• Explain the I-V characteristics of a diode, its regions of operation, obtain the bias point.

• Solve problems on large and small signal diode circuits by making sensible decisions on which models to use.

• Draw and analyze diode applications circuits such as rectifiers, regulators, power supplies, limiter circuits.

• Explain the basic operation, input/output characteristics and regions of operation of the BJT (npn and pnp) in the common-base, common-emitter and common collector configurations.

• Perform dc analysis (algebraically and graphically using current-voltage curves with superimposed load lines) and design of CB, CE and CC transistor circuits.

• Describe the operation and structure of field effect transistors (JFET/MOSFET) and perform dc circuits analysis.

• Apply circuit-analysis software to analyze the dc and small-signal operation of fundamental electronic circuits.

Teaching Methodology:

Lectures 42 hours

Labs 30 hours

Course Content

• Basic semiconductor concepts: crystal structure, energy bands electron and hole carrier current, p- and n-type semiconductors

• Semiconductor diode construction, diffusion and drift currents, barrier potential, forward and reverse biased p-n junctions, breakdown

• Ideal and real diodes, I-V curves, diode current equations, models, ac and dc resistance, temperature effects, power dissipation, Zener diode, breakdown, ratings and specifications

• Analysis of dc diode circuits, dc load line, bias point, analysis of small-signal diode circuits, half and full wave rectifiers, capacitive filtering, switching and waveshaping circuits, Zener regulator analysis and design

• Bipolar junction transistor types and structure, regions of operation, common base, common emitter, and common collector input/output characteristics, bias circuit analysis and design, dc load lines, algebraic and graphical quiescent point determination, BJT as a switch

• JFET and MOSFET (enhancement type) transistor construction and operation, characteristic curves, bias circuit analysis, JFET current source, JFET as an analog switch

Assessment Methods:

Final Exam

Mid-term/Lab Exam

Required Textbooks/Reading:

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