UNIVERSITY of NICOSIA

Course Code	Course Title	ECTS Credits
ECE-210	Electronics I	6
Department	**Semester**	**Prerequisites**
Engineering	Fall, Spring	ECE-100
Type of Course	**Field**	**Language of Instruction**
Required	Engineering	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	1st	Dr Anastasis Polycarpou
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

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 circuit analysis.

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

Course Contents:

- 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 wave-shaping 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

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