Course Meeting Times

Every Tuesday: 12:30-15:30

Course Description

Semi-conductor basics: concepts and semi-conductor components. Semiconductor diode; physical structure, terminal characteristics, analysis of diode circuits. Bipolar junction transistor (BJT); physical structure and operating modes, BJT as a switch; DC biasing, BJT as an amplifier, small-signal model, basic amplifier circuits. MOSFET; structure and operating modes, MOSFET as a switch, MOSFET amplifiers. Operational amplifiers; concepts and application examples.

Text Books

Microelectronic circuits by Sedra Smith

Elektronik by Mehmet Sait Türköz

Exams and Grading

Two midterm exams (each 20%), two quizzes (each 10%) and one final exam (40%).

Midterm Exams: 30 October (could be after 5 pm, time to be arranged) and 10 December 2019

Pop Quizzes: 8 October and 26 November 2019 during regular class hours

Exam dates

http://www.ehb.itu.edu.tr/exams.php

LEC #	TOPICS
1	Introduction, overview of topics, overview of basic knowledge required for this course
2	Atomic models, crystal structure, semiconductor physics, doping, current flow mechanisms, Continuity Equation
3	pn junction, currents in unbiased pn junction, formation of depletion layer, carrier density diagrams, derivation of potential barrier and depletion layer thickness, and Semiconductor Diode Equation.
4	Types of diodes, Zener effect, Zener diodes, diode capacities, sample circuits constructed with diodes
5	Transistor physics, physical characteristics of BJT, biasing conditions, current components, transistor parameters

LEC #	TOPICS
6	BJT as a switch and biasing for analog applications
7	Midterm Exam 1
8	Transistor amplifier circuits: equivalent AC circuits, small signal analysis
9	Transistor amplifier circuits: gain and input/output resistance calculations, cascade amplifier circuits
10	Differential amplifier circuits: configurations, gain and input/output resistance and CMRR calculations
11	MOSFET, physical characteristics. MOS as a switch and biasing for analog applications
12	Midterm Exam 2
13	Transistor amplifier circuits: MOS amplifiers
14	Operational Amplifiers (OPAMP) and applications