ECE-UY-3114, Solid State Electronic Devices and Circuits I

Department of Electrical and Computer Engineering, Tandon School of Engineering, New York University

This course is the first part of the undergraduate Solid State Electronics Sequence ECE-UY-3114-3124. ECE-UY-3114 is a required course for all EE/CompE students, whereas ECE-UY-3124 is an elective. ECE-UY-3114 will be based on basic circuit theory covered in the Circuits ECE-UY-2004 class. It will first introduce analysis and applications of electronic circuits using ideal amplifier blocks called operational amplifier (OP-AMP). The internal circuitry of such microelectronic amplifiers use different kinds of semiconductor components called diodes and transistors. We will discuss basic physical operation of diodes and transistors, followed by the analysis and design of practical electronic circuits employing such semiconductor components. Transistors based on bipolar junctions (BJT) as well as field-effect operations (FET) will be studied. Examples of practical circuits that use diodes and transistors include ac-to-dc converters, amplifiers and digital switching gates. Such electronic circuits are building blocks of all modern communication and computer systems.

Text: A. Sedra and K. Smith, *Microelectronic Circuits, Latest (8th) Edition*, Oxford University Press (2020).

Course Outline

Topic	Description	ESTIMATED LECTURE HOURS
1(ChI.1)	Introduction, amplifier basics, circuit model and frequency response of amplifiers	6
2(ChI.2)	Operational amplifier, inverting and non-inverting configuration, close and open-loop response, gain-bandwidth product, slew rate	6
3(ChI.3,4)	Diode, rectifier, limiter, clamp, semiconductor physics	9
4(ChI.6,7)	Bipolar junction transistor (BJT), basic operation, small signal model; cut-off, active and saturation regions, biasing; different amplifier configurations; BJT as a digital switch.	10
5(Ch.5,7)	Field-Effect Transistors (FET and MOSFET), basic operation, biasing, small signal model, amplifier configurations.	8

	Test I and II	3
	TOTAL	42 hours

Spring 2020

Instructor: Prof. Nirod K. Das.
Office: Rm LC-266C, Phone (646) 977-3192, Email: nkd217@nyu.edu

Lecture Hours: 12.00-1.50pm Monday, 12.00-12.50 Wednesday, Room JAB-775B
Recitation: 1.00-1.50pm Wednesday, Room JAB755. The recitation hour will be used for additional technical discussion related to lecture class or laboratory, as needed.
Office Hour: 2.00-3.00pm Monday.

Total Course Grading: Theory part: 80%, Laboratory part (graded by lab instructors): 20%:
Grading for the Theory Part: Midterm: 30%, Homework and quiz: 20%, Final examination: 50%