



EHB 442E: Semiconductor Devices

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Required text: Chenming Hu, “Modern Semiconductor Devices for Integrated Circuits”, publically available at <http://www.eecs.berkeley.edu/~hu/Book-Chapters-and-Lecture-Slides-download.html>

Optional text (very much recommended): Ben G. Streetman, Sanjay Banerjee, “Solid State Electronic Devices”, 6th edition, Prentice Hall. (This book is also translated into Turkish by a scientific committee – “Katı Hal Elektroniği Devre Elemanları” by Palme Yayıncılık. You are welcome to buy and use this book, but please know that the course will completely be taught in English.)

Course description: In this course, you will be introduced to the wonderful world of solid state devices. We will start by first going through the fundamentals of semiconductor physics and quantum mechanics to build the foundation for a thorough understanding of the advanced course material. Then, we will analyze the pn-junctions, metal-semiconductor junction, bipolar junction transistors (BJTs), metal-oxide-semiconductor (MOS) capacitor, and MOS field-effect-transistors (MOSFETs).

Grading: 40% Midterm, 40% Final exam, 20% HW (Total of 4 sets)

Topics:

09/17:	Basics of semiconductor physics and quantum mechanics	
09/24:	Festival of Sacrifice – No class	
10/01:	Energy bands and charge carriers in semiconductors	
10/08:	Excess carriers in semiconductors	HW1
10/15:	PN-junction theory	
10/22:	Continuity equations in diodes	HW2 & HW1 return
10/29:	Republic Day – No class	
11/05:	Metal-semiconductor junction theory	HW2 return
11/12:	Midterm	
11/19:	BJT operation – Biasing of BJTs	
11/26:	BJT device models – Ebers Moll Model	
12/03:	Secondary effects in BJTs	HW3
12/10:	MOS capacitor	HW3 return
12/17:	MOSFET operation	HW4
12/24:	Secondary effects in MOSFETs	HW4 return