6.012 Electronic Devices and Circuits
Fall 1999
Tentative Schedule

Date	Lec/Rec#	Description	Reading
9/9	L1	6.012 Outline: grading, ethics, overview of semiconductor applications; silicon IC technology	2.5
9/14	L2	Intrinsic semiconductors, electrons and holes, bond model, generation recombination and thermal equilibrium; doping, donors, acceptors, compensation	2.1-2.2
9/16	L3	Carrier transport; drift velocity, drift current density, diffusion current density	2.4
9/21	L4	The PN junction; carrier concentration and potential in thermal equilibrium, 60mV rule	3.2-3.3
9/23	L5	The p-n junction in thermal equilibrium, reverse bias	3.4-3.6
9/28	L6	Introduction to the MOS structure, MOS capacitor in thermal equilibrium	3.7
9/30	L7	MOS capacitor under applied bias, accumulation, depletion, and inversion regions	3.8-3.9
10/5	L8	MOSFET physical structure, circuit symbol and terminal characteristics, MOS transistor characteristics	4.1-4.3
10/7	L9	MOS transistor; backgate effect, MOSFET in saturation	4.4
10/12	L10	MOSFET small signal model	4.5
10/14	L11	Digital logic concepts, inverter characteristics, logic levels and noise margins, transient characteristics, inverter circuits, NMOS/resistor loads	5.1-5.2

10/19	L12	NMOS/current source load, CMOS inverter, static analysis	5.3-5.4
10/21	L13	CMOS inverter, propagation delay static model, static CMOS gates	5.5
10/26	L14	p-n junction diode terminal characteristics, minority carrier concentration under forward + reverse bias	6.1-6.3
10/28	L15	Short base approximation, steady state diffusion equation with currents in p-n junction	6.3
11/2	L16	Introduction of bipolar junction transistor, terminal characteristics, forward active bias, current gain	7.1-7.2
11/4	L17	Reverse active mode and Saturation, The Ebers-Moll model	7.3-7.4
11/9	L18	Single stage amplifiers, two port small signal model; common source amplifier with resistor and current source supply	8.1-8.5
11/16	L19	Common base/gate amplifier, common collector/drain	8.8-8.9
11/18	L20	Review frequency domain analysis; current gain frequency response of common emitter amplifier	10.1-10.3
11/23	L21	Voltage gain frequency response of common emitter amplifier, full analysis of common emitter, the Miller approximation	10.4
11/30	L22	Open circuit time constant analysis, CE CB CC	10.5-10.6
12/2	L23	Voltage sources, MOS current sources, current sources and sinks	9.4
12/7	L24	Differential amplifier, half circuit incremental analysis, differential mode gain, common mode gain, common mode rejection	11.1-11.4
12/9	L25	A complete differential cascode voltage amplifier	