University of California, Berkeley *Spring* 2005
EECS 217 *Prof. A. Niknejad*

Course Syllabus

Course: Microwave Circuits
Instructor: Prof. Ali Niknejad, 572 Cory Hall, 2-0459, niknejad@eecs
Guest Insturctor: Dr. Luiz Franca-Neto
Class Schedule: TuTh 11:00-12:30 PM, 293 Cory Hall
Office Hours: MTh 10-11 or by appointment (email)

Grading Policy:		
	Homework	20%
	Midterm	20%
	Project	30%
	Final	30%

Prerequisites: EECS 117 and 140 or equivalent. EECS 242 provides a helpful background although we will review most of the needed material for this course.

Project: Design and simulation of a microwave circuit block meeting given specification.

Tools: ADS, SpectreRF, Matlab/Mathematica

Textbook:

Microwave Engineering, David Pozar, 2nd ed. Wiley 1998.

References:

Ramo, Whinnery, Van Duzer, *Fields and Waves in Communication Electronics*, Wiley 1984

R. E. Collin, *Foundations for Microwave Engineering*, McGraw-Hill, 1966

G. Gonzalez, *Microwave Transistor Amplifiers*, Prentice-Hall, 1984

T.C. Edwards, *Foundations for Microstrip Circuit Design*, Wiley 1981

G. D. Vendelin, *Design of Amplifiers and Oscillators by the S-Parameter Method*, Wiley-Interscience, 1982.

Vendelin, Pavio, Rohde, *Microwave Circuit Design*, Wiley 1990.

Yannis Tsividis, *Operation and Modeling of the MOS Transistor*, 2nd ed, McGraw-Hill, c1999.

Date	Lecture	Title	Topics
1/18	1	Review of Field Theory	origin of circuit theory; Maxwell's eq.
1/20	2	Review of Field Theory	power; impedance; surface impedance
1/25	3	Distributed Circuits	resistors, capacitors
1/27	4	T-Lines (lossless, lossy)	volt, cur, impedance, swr
2/1	5	T-Lines in Time	transients
2/3	6	T-Line Resonators	Q factor, "lump" Q, Layout
2/8	7	ISSCC	no lecture
2/10	8	Smith Chart	
2/15	9	Impedance Matching	stubs, multi-section (tapered)
2/17	10	Imepdance Matching	lumped elements
2/22	11	Network Analysis	Y,Z,S,ABCD,T
2/24	12	Amplifiers as Two-Ports	Def of Gain
3/1	13	Amplifiers as Two-Ports	Gmax, Mason
3/3	14	Stability	stability circles
3/8	15	Transformer Matching	T-lines at low freq, T-line baluns, etc
3/10	16	Hybrids	three ports; four ports; power comb/div
3/15	17	Hybrids	couplers
3/17	18	Hybrids	applications and examples
3/29	19	Filters	bloch waves, periodic structures
3/31	20	Filters	the insertion loss method; impedance inverter; coupled T-lines; implementation details
4/5	21	Filters	high-Z, low-Z, distributed
4/7	22	Noise	two port noise char; correlation term; Fmin
4/12	23	Noise	system noise analysis
4/14	24	Active Devices (CMOS, SiGe)	Technology, device layout, small signal models
4/19	25	LNA	examples from industry/academia
4/21	26	Broadband Amps	shunt fb, active filter, dist amps
4/26	27	Power Amps	class A, B; distributed; examples
4/28	28	Osc	theory (neg resistance)
5/3	29	Osc	examples from industry/academia
5/5	30	Mixers	theory
5/10	31	Mixers	examples from industry/academia