EECS 105: Microelectronic Devices and Circuits

Spring 2002 Schedule
R. T. Howe

WEEK	LECTURE TOPICS	READING	LAB
Week 1			*no lab*

Phasors and the Frequency Domain

WEEK	LECTURE TOPICS	READING	LAB
	Lec. 1 (1/23) course overview: sinusoidal sources	Reader: OS excerpt	
	Lec. 2 (1/25) phasor representation; impedance	Reader: OS excerpt	
Week 2			*Exp. 1*
	Lec. 3 (1/28) transfer functions, time/frequency domain	HS 10.1	
	Lec. 4 (1/30) Bode plots: first-order transfer functions	HS 10.1	
	Lec. 5 (2/1) Second-order circuits: time domain	Reader: OS excerpt	
Week 3			*Exp. 2*
	Lec. 6 (2/4) 2nd order f domain; general Bode plots	Reader: OS excerpt, HS 10.1	

IC Two-Terminal Circuit Elements: Resistors and Capacitors

WEEK	LECTURE TOPICS	READING	LAB
	Lec. 7 (2/6) donors and acceptors in Si; drift current	HS 2.1-2.3	
	Lec. 8 (2/8) Ohm's law, IC resistors, sheet resistance	HS 2.6	
Week 4			*Exp. 3*
	Lec. 9 (2/11) metal-metal capacitor	HS 3.1	
	Lec. 10 (2/13) pn junction (equilibrium, reverse bias)	HS 3.4.1-2, 3.5	
	Lec. 11 (2/15) pn junction small-signal capacitor	HS 3.6	
Week 5			*Exp. 4*
	(2/18) Presidents' Day		
	Lec. 12 (2/20) MOS small-signal capacitor	HS 3.7, 3.9	

The MOSFET

WEEK	LECTURE TOPICS	READING	LAB
	Lec. 13 (2/22) MOSFET large-signal overview	HS 4.1	
Week 6			*Exp. 5*
	Lec. 14 (2/25) MOSFET large-signal model	HS 4.3	
	Lec. 15 (2/27) MOSFET small-signal model	HS 4.5	
	Lec. 16 (3/1) pn junction diode under forward bias	HS 6.1-6.3	

WEEK	LECTURE TOPICS	READING	LAB

pn Junction Devices

Week 7   *no lab*

    Lec. 17 (3/4) circuit models, diffusion capacitance   HS 6.4-5

    Midterm I. Wednesday, March 6, 6-7:30 pm
        (no lecture 3/6)

    Lec. 18 (3/8) bipolar transistors in forward-active bias   HS 7.1-2

Week 8   *Exp. 6*
    Lec. 19 (3/11) bipolar transistor small-signal model   HS 7.5

Integrated Single-Stage Amplifiers

    Lec. 20 (3/13) Amplifier concept; 2-port parameters   HS 8.1,2
    Lec. 21 (3/15) Common source amplifier: biasing   HS 8.3

Week 9   *Exp. 7*
    Lec. 22 (3/18) Common source amp: two-port model   HS 8.5
    Lec. 23 (3/20) Common gate amplifier: biasing   HS 8.8
    Lec. 24 (3/22) Common gate amp: two-port model   HS 8.8

Spring Break March 25-29

Week 10   *Exp. 8*
    Lec. 25 (4/1) Common drain amplifier: biasing   HS 8.9
    Lec. 26 (4/3) Common drain amp: two-port model   HS 8.9
    Lec. 27 (4/5) Bipolar amplifier stages   HS 8.1,2,9

Week 11   *Exp. 9*
    Lec. 28 (4/8) Summary of single stage amplifiers   HS 8.1-9

Frequency Response of Single-Stage Amplifiers

    Lec. 29 (4/10) Current amplifiers: transition frequency   HS 10.2-3
    Lec. 30 (4/12) Voltage amplifiers: Miller approximation   HS 10.4

Week 12   *no lab*

    Lec. 31 (4/15) Voltage and current buffer *f* response   HS 10.5-6

    Midterm II. Wednesday, April 17, 6-7:30 pm (no lecture 4/17)

    Lec. 32 (4/19) Multistage amplifiers: two-port cascades   HS 9.1-2

Integrated Multistage Amplifiers

Week 13   *Exp 10*
    Lec. 33 (4/22) Direct-coupled amps: DC level shifting   HS 9.3
    Lec. 34 (4/24) Integrated voltage/current supplies I   HS 9.4
    Lec. 35 (4/26) Integrated voltage/current supplies II   HS 9.5

WEEK	LECTURE TOPICS	READING	LAB

Week 14   *Exp 11*

      Lec. 36 (4/29) Multistage amp examples: transconductance   HS 9.5
      Lec. 37 (5/1) Multistage amp examples: voltage wrap-up   HS 9.5
      Lec. 38 (5/3) Multistage wrap-up   HS Chap. 9

Multistage Amplifier Frequency Response

Week 15   *Makeup*
      Lec. 38 (5/6) Open-circuit time constants   HS 10.4.4
      Lec. 39 (5/8) Multistage amp frequency response   HS 10.7
      Lec. 40 (5/10) Voltage amplifier example   HS 10.7.2

Week 16

      Lec. 41 (5/13) Course wrap-up

Final Examination: Saturday, May 18, 2002, 8:00 am – 11:00 am.

HS: R. T. Howe and C. G. Sodini, *Microelectronics: An Integrated Approach*, Prentice Hall, 1997.
Reader: EE 105 course reader, available at Copy Central. OS = W. G. Oldham and S. E. Schwarz,
      Introduction to Electrical Engineering, 1st Edition, HRW, 1984.