

Course No.: INEL 4202

Electronics II 3 Credits

August 7, 2012

Pre-requisite: INEL 4201, INEL 4102

Textbook: Sedra, Adel S.; Smith, Kenneth C.; *Microelectronic Circuits, 5th Edition*, Oxford University Press, New York, 2004.

**COURSE DESCRIPTION**

Study of frequency response, feedback and stability in amplifiers. Analysis and design of multi-stage amplifiers, wave generation and power circuits.

Primary objectives of course:

1. To develop the ability to analyze and design wide band analog multi-stage amplifiers with and without feedback, as well as circuits based on operational amplifiers, active filters, and power amplifiers.

Reference Books:

1. Microelectronic Circuit Design, Jaeger and Blalock, 2<sup>nd</sup> ed., McGraw Hill, 2004.
2. Engineering Electronics, Robert Mauro, Prentice Hall, 1989

Examinations and Grading:

Three partial examinations and a final examination will be administered during the semester.

Preliminary Schedule

Lesson (Date)	TOPIC	Article	Problems
1 (8/9)	Introduction, frequency response, Bode plots	1.6.3-1.6.5	1.66, 1.67, 1.68
2 (8/14)	Bypass and coupling capacitors	4.9.3, 5.9.3	4.98, 4.99, 4.101, 4.104, 5.163, 5.164, 5.166, 5.167
3 (8/16)	BJTs and FET high frequency models	4.8, 5.8	4.96, 4.97, 5.151, 5.153
4 (8/21)	Common emitter and common source amplifiers, Miller's theorem	6.6, 6.9	6.(66, 67, 70, 71, 72, 74, 75, 110, 114)
5 (8/28)	Common gate and common base amplifiers	6.7.1, 6.7.2	6.94, 6.95
6 (8/30)	Common drain and common collector amplifiers	6.10.2, 6.10.3	6.(117, 118, 119, 120, 121)
7 (9/4)	Multistage amplifiers, Effect of bandwidth on pulse response	Notes App. D5	
<b>8 (9/6)</b>	<b>REVIEW FOR EXAM I</b>		
9 (9/11)	Feedback and its effect on gain, bandwidth and distortion; Classes of feedback amplifiers, effect of feedback on input and output impedance	8.1, 8.2, 8.3	8.1, 8.2, 8.3, 8.8, 8.14, 8.17, 8.21, 8.22, 8.24, 8.25, 8.26
<b>Monday, Sept. 13</b>	<b>Exam I</b>		

10 (9/13)	Feedback topologies. Analysis of feedback amplifiers with discrete devices	8.4-8.7	8.27, 8.31, 8.32, 8.33, 8.34, 8.38
11 (9/18)	Analysis of feedback amplifiers with discrete devices (cont.)	8.4-8.7	8.42, 8.46, 8.51, 8.52
12 (9/20)	Stability, gain and phase margins	8.10, 8.11	8.70, 8.71, 8.73, 8.76, 8.77, 8.79
13 (9/25)	Sinusoidal oscillators, RC oscillators	13.1, 13.2	13.10, 13.13, 13.14, 13.18
14 (9/27)	LC Sinusoidal oscillators,	13.3	13.21, 13.22, 13.23
15 (10/4)	LC Sinusoidal oscillators, quartz crystal oscillators		
16 (10/9)	<b>REVIEW FOR EXAM II</b>		
17 (10/11)	Operational amplifiers, Summers, integrators, inverting and non-inverting amplifiers	2.1- 2.4	2(1, 2, 8, 9, 11, 12, 16, 20, 22, 30, 44, 46, 49, 60, 62, 72, 74)
18 (10/16)	Integrators and differentiators, Applications	2.8	2.112, 2.113
<b>Tuesday, October 16</b>	<b>Exam II</b>		
19 (10/23)	Current sources	6.3, 6.12	6.21, 6.22, 6.23, 6.30, 6.31, 6.33, 6.131, 6.140, 6.141, 6.142, 6.143
20 (10/23)	The differential amplifier	7.1-3, 7.5	7.1, 7.2, 7.11, 7.14, 7.15, 7.17, 7.20, 7.21, 7.37, 7.38, 7.39, 7.40, 7.41, 7.42, 7.62, 7.67, 7.68, 7.74
21 (10/25)	DC analysis of the 741 opamp	9.3, 9.4...	9.20, 9.21, 9.22, 9.25, 9.27, 9.35, 9.37
22 (10/30)	AC analysis of the 741 op-amp	9.5	9.40, 9.41, 9.46, 9.47, 9.48
23 (11/1)	Frequency response and slew rate	9.6	9.57, 9.60, 9.61
24 (11/8)	CMOS opamp DC and AC analysis	9.1	9.2, 9.3, 9.5
25 (11/15)	Freq. resp. and slew rate of CMOS opamp	9.2	9.7, 9.8, 9.9
26 (11/20)	Folded cascode opamp	9.2	9.12, 9.14, 9.17, 9.18
27 (11/27)	<b>REVIEW FOR EXAM III</b>		
28 (11/29)	Amplifier classes (A,B,C) Class A output stages, Class B and AB amplifiers	14.1-3	14.1, 14.3, 14.10, 14.12, 14.14,
	<b>Exam III</b>		
29 (12/4)	Class AB amplifiers, biasing	14.4, 14.5	14.16, 14.19, 14.22, 14.24
30 (12/6)	Power Amplifiers	Notes	