

Course No.: INEL 4202

Electronics II 3 Credits

January 16, 2013

Pre-requisite: INEL 4201, INEL 4102

Textbook: Sedra, Adel S.; Smith, Kenneth C.; *Microelectronic Circuits, 6<sup>th</sup> Edition*, Oxford University Press, New York, 2010.**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 (1/17)	Introduction, frequency response, Bode plots	1.6	1.(65, 66, 67)
2 (1/22)	Bypass and coupling capacitors	9.1	9.(1, 3, 5, 11, 12, 14, 15)
3 (1/24)	BJTs and FET high frequency models	9.2	9.(21, 25)
4 (1/29)	Common emitter and common source amplifiers, Miller's theorem	9.(3-5)	9.(33, 34, 38, 39, 60, 61, 64, 65, 68, 69)
5 (1/31)	Common gate and common base amplifiers	9.6	9.(76, 84)
6 (2/5)	Common drain and common collector amplifiers	9.7	9.(85, 86, 88, 89)
7 (2/7)	Multistage amplifiers, Effect of bandwidth on pulse response	9.9, 9.10, App. E	9.(102, 104, 108, 109, 112)
<b>8 (2/12)</b>	<b>REVIEW FOR EXAM I</b>		
9 (2/14)	Feedback and its effect on gain, bandwidth and distortion; Classes of feedback amplifiers, effect of feedback on input and output impedance	10.(1-3)	10.(1,7,16,20, 27,28,30)
<b>Thursday, Feb. 14</b>	<b>Exam I</b>		

10 (2/21)	Feedback topologies. Analysis of feedback amplifiers with discrete devices	10.(4-8)	10.(31, 34, 35, 43, 46, 47)
11 (2/26)	Analysis of feedback amplifiers with discrete devices (cont.)	10.(4-8)	10.(53, 55, 57, 61, 65)
12 (2/28)	Stability, gain and phase margins	10.(9,10, 12)	10.(89, 90, 92, 95, 96, 98)
13 (3/5)	Sinusoidal oscillators, RC oscillators	17.(1,2)	17.(9, 13, 14, 18)
14 (3/7)	<b>REVIEW FOR EXAM II</b>		
15 (3/12)	LC Sinusoidal oscillators	17.3	17.(21, 22, 23)
<b>Tuesday, March 12</b>	<b>Exam II</b>		
16 (3/14)	LC Sinusoidal oscillators, quartz crystal oscillators		
17 (3/19)	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 (3/21)	Integrators and differentiators, Applications	2.5	2.79, 2.80
19 (4/2)	Current sources	7.(4,5)	7.(46, 47, 48, 55, 56, 58, 67, 70, 76, 77, 78)
20 (4/4)	The differential amplifier	8.(1-3, 5)	8.(1, 2, 9, 25, 27, 29, 32, 33, 53, 60, 61, 62, 63, 64, 85, 91, 94, 102)
21 (4/9)	DC analysis of the 741 opamp	12.(3,4)	12.(23, 24, 25, 28, 29, 37, 39)
22 (4/11)	AC analysis of the 741 op-amp	12.5	12.(42, 43, 47, 50)
23 (4/18)	Frequency response and slew rate	12.6	12.(59, 62, 63)
24 (4/23)	CMOS opamp DC and AC analysis	12.1	12.(2, 3, 5, 6 )
25 (4/25)	Freq. resp. and slew rate of CMOS opamp		12.(9, 10, 11)
26 (4/30)	Folded cascode opamp	12.2	12.(15, 16, 18, 19)
27 (5/2)	<b>REVIEW FOR EXAM III</b>		
28 (5/7)	Amplifier classes (A,B,C) Class A output stages, Class B and AB amplifiers	11.(1,2)	11. (1, 3, 9, 12, 13)
<b>Tuesday, May 7</b>	<b>Exam III</b>		
29 (5/9)	Class AB amplifiers, biasing	11.(3-5)	11.(15, 19, 22, 23)
30 (5/14)	Power Amplifiers	Notes	