ELEC 2260: Linear Integrated Circuits

A. COURSE DESCRIPTION
   Credits: 4
   Lecture Hours/Week: 2
   Lab Hours/Week: 4
   OJT Hours/Week: *.*
   Prerequisites: None
   Corequisites: None
   MnTC Goals: None
   This course covers linear integrated circuits. In this course a wide variety of amplifiers, oscillators and
   generators will be analyzed, which use the op amp. The op amp is one of the most versatile integrated
   circuits; it provides high gain and wideband width in a simple configuration. (Prerequisite: ELEC1218) (4
   Credits: 2 lecture/2 lab)

B. COURSE EFFECTIVE DATES: 07/01/2010 - Present

C. OUTLINE OF MAJOR CONTENT AREAS
D. LEARNING OUTCOMES (General)
1. Breadboard experiments
2. Interpret data sheets
3. Locate IC pin designations
4. Distinguish between analog and digital systems
5. Measure input offset voltage
6. Describe analog signal characteristics
7. Measure input bias current
8. Measure input impedance
9. Measure slew rate
10. Measure common-mode rejection ratio
11. Measure closed-loop response
12. Calculate voltage gain
13. Troubleshoot amplifier
14. Identify three stages of an op amp
15. Verify voltage follower operation
16. Verify noninverting amplifier operation
17. Analyze op-amp input current
18. Measure voltage gain
19. Verify inverting amplifier operation
20. Describe IC identifications
21. Measure summing amplifier operation
22. Analyze common-mode characteristics
23. Measure difference amplifier operation
24. Describe feedback characteristics
25. Identify input and feedback elements
26. Analyze inverting op amp circuit
27. Verify 3 terminal regulator operation
28. Analyze a noninverting op amp circuit
29. Measure oscillator frequency
30. Measure input offset voltage
31. Analyze a summing op amp circuit
32. Measure input impedance
33. Analyze a difference op amp circuit
34. Measure common-mode reflection ratio
35. Analyze a comparator circuit
36. Distinguish between dual and single power supply circuits
37. Measure bandwidth
38. Describe troubleshooting techniques
39. Verify constant-current source operation
40. Verify summing amplifier operation
41. Analyze system manuals
42. Verify difference amplifier operation
43. Verify current to voltage converter operation
44. Describe troubleshooting precautions
45. Verify voltage to current converter operation 
46. Select test equipment 
47. Verify noninverting amplify operation 
48. Verify voltage converter operation 
49. Describe voltage regulators 
50. Verify three terminal regul operation 
51. Measure oscillator operating frequency 
52. Measure ripple voltage 
53. Describe current regulators 
54. Measure response time 
55. Analyze series regulators 
56. Verify wein-bridge oscillator operation 
57. Analyze shunt regulators 
58. Verify sine-cosine oscillator operation 
59. Analyze switching regulators 
60. Describe monolithic regulator circuits 
61. Analyze protection circuits 
62. Analyze current to voltage converter 
63. Analyze voltage to current converter 
64. Verify wein-bridge operation 
65. List oscillator characteristics 
66. Verify square-wave generator operation 
67. Describe oscillator operation 
68. Verify Schmitt trigger operation 
69. Verify triangle-wave generator operation 
70. Calculate operating frequency 
71. Verify timer circuit operation 
72. Identify frequency determining components 
73. Verify sine-cosine oscillate operation 
74. Verify active filter circuit operation 
75. Analyze RC oscillators 
76. Analyze crystal oscillators 
77. Describe multivibrator operation 
78. Verify peak detector operation 
79. Verify triangle-wave genera operation 
80. Measure phase shift 
81. Measure holding time 
82. Analyze square-wave generator 
83. Analyze triangle-wave generator 
84. Verify window detector operation 
85. Measure thresholds 
86. Analyze staircase-wave generator 
87. Verify instrumentation amplifier operation 
88. Analyze timer circuit
89. Analyze active filter circuit
90. Verify astable timer operation
91. Analyze peak detector circuit
92. Verify sample-and-hold circuit operation
93. Analyze Schmitt trigger circuit
94. Verify square-wave oscillate operation
95. Analyze window detector circuit
96. Verify comparator ADC
97. Analyze instrumentation amplifier
98. Verify DAC operation
99. Describe conversion systems
100. Verify monostable timer operation
101. Verify S/H circuit operation
102. Describe DAC operation
103. Describe ADC operation
104. Analyze sample-and-hold circuits
105. Verify ADC operation

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies
   None

F. LEARNER OUTCOMES ASSESSMENT
   As noted on course syllabus

G. SPECIAL INFORMATION
   None noted