

Minnesota State College Southeast

ELEC 2214: Microprocessor Applications

A. COURSE DESCRIPTION

Credits: 6

Lecture Hours/Week: 3

Lab Hours/Week: 6

OJT Hours/Week: *.*

Prerequisites: None

Corequisites: None

MnTC Goals: None

This course covers the theory behind interfacing sense and control software and hardware to the microprocessor. Topics to be covered include ADC, DAC, signal conditioning, sensors, motors and actuators. Some of these will be bread-boarded in the lab. (Prerequisite: ELEC2213) (6 credits: 3 lecture/3 lab)

B. COURSE EFFECTIVE DATES: 10/14/1998 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

D. LEARNING OUTCOMES (General)

1. Perform straight line program execution
2. Define microprocessor terms
3. Use program single step mode
4. Describe microprocessor registers
5. Describe addressing modes
6. Use condition code registers
7. Describe straight line programs
8. Describe conditional and unconditional branching
9. Calculate relative addresses
10. Develop flow charts
11. Use relative addressing
12. Calculate branching addresses
13. Perform BCD to binary conversion
14. Perform multiple-precision arithmetic
15. Perform BCD program packing
16. Analyze block diagrams
17. Use subroutines to display messages
18. Describe interrupts
19. Construct a DAC converter
20. Write subroutine programs
21. Analyze a DAC converter
22. Describe input and output operations
23. Use programs to generate DAC waveforms
24. Describe DAC codes
25. Construct a programmable gain amplifier
26. Define DAC terms
27. Construct an ADC
28. Describe PIA operation
29. Analyze an ADC
30. Use a lookup table
31. Construct an ADC interface
32. Explain DAC motor control
33. Use an ADC control program
34. Describe servo amplifiers
35. Use an ADC to measure voltage
36. Describe multiplexer operation
37. Construct a V/F converter
38. Describe sample/hold circuits
39. Describe ADC techniques
40. Analyze a V/F converter
41. Define ADC terms
42. Use a V/F converter to measure voltage
43. Describe ADC operation
44. Describe handshake control

45. Calculate converter resolution
46. Construct an optical interrupter
47. Calculate converter accuracy
48. Describe a data acquisition system
49. Construct a motor speed control circuit
50. Describe industrial control systems
51. Use a microprocessor to measure motor speed
52. Analyze bridge signal conditioning circuits
53. Use optical techniques to measure position
54. Describe temperature sensors
55. Describe optical sensors
56. Analyze a Hall-effect device
57. Construct a stepper motor interface
58. Analyze program control of stepper motors
59. Describe magnetic detection circuits
60. Define stress and strain
61. Change motor speed and rotation
62. Describe pressure sensors and transducers
63. Construct a light probe sensing circuit
64. Describe flow rate measurement
65. Analyze a light probe sensing circuit
66. Describe liquid level measurement
67. Describe DC motor operation
68. Calculate motor speed regulation
69. Describe stepper motor operation
70. Describe stepper motor control

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted