

## ME 445 (462): Micro Computer Interfacing (4 cr.)

**Program Outcomes:** (Asterisks show outcomes that are assessed for Program Assessment)

- 1b. Demonstrate knowledge of calculus-based physics
- 1d. Demonstrate ability to solve differential equations
- 2f. Demonstrate the ability to design systems
- 3a. Work effectively on multidisciplinary teams
- 3d. Demonstrate ability to communicate effectively with the written word
- 3e. Demonstrate ability to communicate effectively in oral communications
- 3f. Demonstrate ability to learn in less structured circumstances
- 4a. Demonstrate an understanding of the principles of measurements, instrumentation methods, and experimental design
- 4b. Exhibit broad understanding of instruments and sensors, both in theory and in practice
- 4d. Demonstrate the ability to develop and utilize models
- 4e. Use software to solve engineering problems including ODE's, systems of linear equations, and numerical integration

**Course Objectives:** (Mapping to Program Outcomes shown in brackets)

- A. Understand linear analog circuits with resistors, capacitors, and op-amps and their response under AC and DC excitation and be able to build such circuits. [1b, 1d, 3a, 3f, 4d, 4e]
- B. Understand nonlinear analog circuits with transistors and diodes and be able to build such circuits. [3a, 3f, 4d, 4e]
- C. Understand digital TTL circuits including digital logic gates and be able to build such circuits. [3a, 3f, 4d, 4e]
- D. Understand and use analog/digital interfaces including analog to digital converters. [3a, 3f]
- E. Understand the operation, interfacing, and use of sensors and actuators in electromechanical systems. [3a, 3f, 4a, 4b]
- F. Understand the basics of digital signal processing. [1d, 4d, 4e]
- G. Understand how to design, build, and analyze electromechanical systems, and how to properly report the results. [2f, 3a, 3d, 3e, 4d, 4e ]

H. Advance proficiency in professional communications and interactions. [3a, 3d, 3e, 3f]

**Course Learning Outcomes:** (Mapping to Course Objectives shown in brackets)

Upon completion of this course, students should be able to:

1. Analyze, design and build analog DC and AC circuits using resistors, capacitors, inductors, diodes, transistors and op-amps. [A, B, G]
2. Analyze, design and build digital TTL circuits. [C, D, G]
3. Build and trouble-shoot analog and digital circuits connected to single chip microcontrollers using prototype wiring and printed circuit board layout. [A, B, C, G, H]
4. Interface common transducers and actuators to microcontrollers. [A, B, C, D, E, G, H]
5. Filter, digitize and analyze electronic signals using analog anti-aliasing filters, A/D converters, FFT and digital filters. [F]
6. Understand and connect computer peripherals using standard interfaces (RS-232, USB). [D]
7. Communicate well using verbal, written and electronic methods. [H]