1. ME 4231, Motion Control Lab

2. 4 credits, 5 contact hours.

3. Instructors: R. Rajamani, Z. Sun

4. Textbook: Not applicable

5. Specific course information:
   a. Catalog description: Microprocessor programming, digital filters, frequency response testing, modeling of electromechanical systems, closed loop velocity and position control, programmable logic controllers, factory automation, open loop position control of a vibratory system using input shaping, closed loop position control using pole placement.
   b. Prerequisites: CSCI 1113, ME 4031W, ME 3281.
   c. Elective for ME students.

6. Course outcomes (related ABET student outcomes indicated in square brackets):
   a. An understanding of the theory of mechatronics, sampling, discrete-time systems and digital closed-loop PID control. [1]
   b. A competency in using software tools to simulate open and closed-loop servomotor systems. [2,7]
   c. An ability to program real-time, closed-loop controllers using a high level programming language. [2]
   d. An ability to utilize data acquisition systems. [6]
   e. An ability to implement software and hardware controllers for real-time control of servo systems. [2,6]
   f. An ability to exploit programmable logic controllers for real-world systems. [2,6]
   g. An ability to document laboratory experiments and results through written reports and oral exams. [3]

7. Course topics:
   a. Mechatronics
   b. C and Matlab programming
   c. Sampling theory and discrete-time systems
   d. Digital filtering
   e. Modeling DC servomotors and system identification
   f. Sensors and actuators
   g. Closed-loop and PID controls
   h. Programmable logic controllers
   i. Labs
      i. C programming methods
      ii. Sampling
      iii. Digital filtering
      iv. Open-loop frequency and transient response of a servomotor
v.  Closed-loop position and velocity control
vi.  PID control
vii.  Use of Simulink and Matlab
viii. Programmable Logic Controllers