ME 401: Mechatronics

Course description: Integration of mechanical and microprocessor-based systems; control theory implemented with data acquisition systems; sensors; actuators, signal conditioning, programmable logic controllers.

Number of credits: 3 (2-3). This course is required.

Course Coordinator: J. Swensen

Prerequisites by course: EE 262; ME 348; certified major in Mechanical Engineering

Prerequisites by topic: 1. Understanding of differential equations
2. Basic knowledge of computers and programming
3. Basic knowledge of the design process
4. Basic machine shop skills

Postrequisites: None

Textbooks/other required materials: None

Course objectives: 1. Understanding of PLC’s and their programming
2. Understanding the use of stepper and servo motors and linear actuators
3. Understanding the use and manipulation of digital filters

Topics covered: 1. Digital Data Acquisition Basics
2. Mechanical systems in the frequency domain
3. Basic control theory (including PID control)
4. Sensors and actuators, matching frequency domain characteristics in mechanical and electronic systems
5. Digital filters, use and application
6. PLC basics and their programming

Expected learning outcomes: 1. Program software packages involving data acquisition
2. Complete tasks involving collection, conditioning and storage of data in a real-time environment and apply appropriate control outputs to modify system behavior
3. Implement programmable logic controllers for timing mechanical devices
4. Integrate frequency response information in the development of control algorithms.
5. Design digital filters by manipulating their filter coefficients
6. Build a mechatronic system with an integrated computer control using actuators, controls, and mechanical system elements.

Class schedule: Two 50-minute lecture sessions per week, for one semester.

Laboratory schedule: One 3-hour laboratory session per week, for one semester.
**Contribution to meeting**

**Engineering Topics**

**the professional component:**

**Relationship of course to student outcomes:**

3 strongly supported; 2 supported; 1 minimally supported

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*Prepared by:* Andrea Butcherite and J. Swensen  
*Date:* May 30, 2018