

ME 401: Mechatronics

<i>Course description:</i>	Integration of mechanical and microprocessor-based systems; control theory implemented with data acquisition systems; sensors; actuators, signal conditioning, programmable logic controllers.
<i>Number of credits:</i>	3 (2-3). This course is required.
<i>Course Coordinator:</i>	J. Swensen
<i>Prerequisites by course:</i>	EE 262; ME 348; certified major in Mechanical Engineering
<i>Prerequisites by topic:</i>	<ol style="list-style-type: none">1. Understanding of differential equations2. Basic knowledge of computers and programming3. Basic knowledge of the design process4. Basic machine shop skills
<i>Postrequisites:</i>	None
<i>Textbooks/other required materials:</i>	None
<i>Course objectives:</i>	<ol style="list-style-type: none">1. Understanding of PLC's and their programming2. Understanding the use of stepper and servo motors and linear actuators3. Understanding the use and manipulation of digital filters
<i>Topics covered:</i>	<ol style="list-style-type: none">1. Digital Data Acquisition Basics2. Mechanical systems in the frequency domain3. Basic control theory (including PID control)4. Sensors and actuators, matching frequency domain characteristics in mechanical and electronic systems5. Digital filters, use and application6. PLC basics and their programming
<i>Expected learning outcomes:</i>	<ol style="list-style-type: none">1. Program software packages involving data acquisition2. Complete tasks involving collection, conditioning and storage of data in a real-time environment and apply appropriate control outputs to modify system behavior3. Implement programmable logic controllers for timing mechanical devices4. Integrate frequency response information in the development of control algorithms.5. Design digital filters by manipulating their filter coefficients6. Build a mechatronic system with an integrated computer control using actuators, controls, and mechanical system elements.
<i>Class schedule:</i>	Two 50-minute lecture sessions per week, for one semester.
<i>Laboratory schedule:</i>	One 3-hour laboratory session per week, for one semester.

Contribution to meeting the professional component: Engineering Topics

Relationship of course to student outcomes:
 3 strongly supported; 2 supported; 1 minimally supported

Student Outcomes Pre-Fall 2018
 (ABET EC2000)

a	b	c	d	e	f	g	h	i	j	k
2	3									2

Student Outcomes Fall 2018 forward
 (ABET EC2019)

1	2	3	4	5	6	7
3				1	3	

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