

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)
<i>Course Coordinator:</i>	J. Swensen
<i>Prerequisites by course:</i>	EE 262; ME 348; admitted to 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: Meets:
1. School of MME educational objectives: 1, 2
2. School of MME program outcomes: 1, 6
3. ABET EC2019, Criterion 3 program outcomes: 1, 5, 6

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

POLICIES

A. Reasonable Accommodation (the nature of the particular course determines which one applies):

- **Pullman Campus.** Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.
- **WSU Online Course.** Reasonable accommodations are available in online classes for students with a documented disability. All accommodations must be approved through your WSU Disability Services office. If you have a disability and need accommodations, we recommend you begin the process as soon as possible. For more information contact a Disability Specialist on your home campus: Pullman or WSU Online (<http://accesscenter.wsu.edu>), Spokane (<http://spokane.wsu.edu/students/current/studentaffairs/disability/>), Tri-Cities (<http://www.tricity.wsu.edu/disability>), Vancouver (<http://studentaffairs.vancouver.wsu.edu/student-resource-center/disability-services>).

B. Academic Integrity

WSU expects all students to behave in a manner consistent with its high standards of scholarship and conduct. Students are expected to uphold these standards both on and off campus and acknowledge the university's authority to take disciplinary action. The Standards of Conduct for Students can be found at <http://conduct.wsu.edu>.

C. WSU Safety

WSU is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, <http://safetyplan.wsu.edu>. It is highly recommended that you visit this web site as well as the University emergency management web site at <http://oem.wsu.edu/> to become familiar with the information provided.