

COURSE NUMBER: ME 4231, 4 credits	COURSE TITLE: Motion Control Lab
TERMS OFFERED: Fall and Spring	PREREQUISITES: ME 4031W ME 3281
TEXTBOOKS/REQUIRED MATERIAL: Mechatronics, W. Bolton, Prentice Hall, 3 rd Edition	PREPARED BY: Professor Durfee DATE OF PREPARATION: September 20, 2005 Updated: May 23, 2007 Updated by Prof. Rajamani
COURSE LEADER(S): Professors Rajamani, Stelson	CLASS/LABORATORY SCHEDULE: One 120 minute lecture and one 180 minute laboratory per week CONTRIBUTION OF COURSE TO MEETING PROFESSIONAL OBJECTIVES: 100% Engineering Topics
CATALOG DESCRIPTION: Real-time programming, data acquisition, digital filters, frequency response testing, modeling of electromechanical systems, closed loop velocity and position control, programmable logic controllers, use of control software tools.	COURSE TOPICS: Lecture topics: <ol style="list-style-type: none"> 1. Mechatronics 2. C and Matlab programming 3. Sampling theory and discrete-time systems 4. Digital filtering 5. Modeling DC servomotors and system identification 6. Sensors and actuators 7. Closed-loop and PID controls 8. Programmable logic controllers Labs: <ol style="list-style-type: none"> 1. C programming methods 2. Sampling 3. Digital filtering 4. Open-loop frequency and transient response of a servomotor 5. Closed-loop position and velocity control 6. PID control 7. Use of Simulink and Matlab 8. Programmable Logic Controllers

COURSE OBJECTIVES	<ol style="list-style-type: none"> 1. Teach basics of mechatronics and real-time control, including sampling theory, sensors, actuators, software and real-time hardware. 2. Have students gain practical experience in real-time control through directed laboratory experiments
COURSE OUTCOMES	<p>(Letters shown in brackets are linked to program outcomes a-k)</p> <ol style="list-style-type: none"> 1. Students understand theory of mechatronics, sampling, discrete-time systems and digital closed-loop PID control [a] 2. Students are competent in using Matlab to simulate open and closed-loop servomotor systems [k] 3. Students can program real-time, closed-loop controllers using C [c, i, k] 4. Students can understand and use data acquisition systems [b] 5. Students have laboratory experience implementing controllers for real-time control of servo systems [b, k] 6. Students have practical experience using programmable logic controllers [b, k] 7. Students gain experience in documenting laboratory experiments and results through written reports and oral exams [g]
ASSESSMENT TOOLS:	<ol style="list-style-type: none"> 1. Laboratory reports 2. Final exam

ME 4231

Nature of Changes:

The catalog description has been rewritten to reflect the current course content.