

Students are encouraged to work together on homework assignments; however, original solutions are required. For homework, the threshold of cheating is defined as follows: If the person grading the assignments is able to identify students who have worked together by their solutions or specific aspects of their solution approach, then the solutions are not original! A homework or other assignment where cheating is found will automatically be given a zero grade

Copying of information from websites without proper citation is considered cheating. Any copying of information without proper citation will result in a zero grade for the assignment.

GE 423 – Introduction to Mechatronics, Spring 2009

Lecture Dates	Topics	Current Lab
Wednesday, January 21, 2009	Introduction, Walk through Syllabus, What is Mechatronics? What parts are we focusing on? Introduction to the MSP430 microcontroller. What are System and Peripheral Registers. Hex numbers and Bitwise operators.	Lab #1
Monday, January 26, 2009	- Scheduling: 1) Single Process Application 2) Hardware Interrupt Scheduler 3) Real-Time OS, DSP/BIOS Scheduler - Microcontroller examples	Lab #1/Finish Soldering Microcontroller
Wednesday, January 28, 2009	- DSP/BIOS: 1) PRD and SWIs 2) HWI and CLK 3) TSK, SEM and QUE - Priority Structure of DSP/BIOS, Time Loading Diagrams - DSP/BIOS Examples	Lab #1/Finish Soldering Microcontroller
Monday, February 2, 2009	- printf, sprintf, null terminated strings - RS 232 Serial Port, The ASCII character set - DSP/BIOS Example for MAX3100 UART Chip	Lab #2
Wednesday, February 4, 2009 HW #1 Due	- Go over VB serial port send and receive code - SPI and I2C serial protocols - DSP/BIOS Example (SPI interface to Color LCD)	Lab #2
Monday, February 9, 2009	- Functions in C, Passing parameters by value or reference - What is an Optical Encoder? A DAC? - What is a Digital I/O port? Driving LEDs - What is a PWM signal? How to generate a PWM signal on the microcontroller.	Lab #3
Wednesday, February 11, 2009	- H-bridge, Example circuit - Friction Compensation - The RC Servo Motor. How to setup a PWM signal for the RC Servo Motor	Lab #3
Monday, February 16, 2009	- What is an ADC? Talk about sampling - Filter design and implementation, Filter Examples in Matlab.	Lab #4
Wednesday, February 18, 2009	- Parallel interfacing vs. serial interfacing - Glue logic, Read Cycle and Write Cycle - Parallel Interfacing Examples	Lab #4
Monday, February 23, 2009	- Review Lab #4 Take Home Exercise - Parallel Interfacing with both Address and Data on the same lines - More Parallel Interfacing examples	Lab #4
Wednesday, February 25, 2009 HW #2 Due	- Finish up Parallel Interfacing - Demo Circuit Board layout software EagleCAD	Lab #4
Monday, March 2, 2009	- PID controller. Ziegler-Nicholas Tuning Method - Integral Windup. Rollover issues. - Robot's speed control algorithm with steering.	Lab #5

Wednesday, March 4, 2009	<ul style="list-style-type: none"> - SPI interfacing example: The LS7366R-S Chip - I2C interfacing example: The MAX7321 Chip 	Lab #5
Monday, March 9, 2009	<ul style="list-style-type: none"> - Review Tasks - The IR Sensor - The Ultrasonic Sensor - The Digital Compass - The Rate Gyro - The LADAR (Laser Range Finder) - Wall-following, Inner-loop and Outer-loop controllers - Review what is expected with your VB application. 	Lab #6
Wednesday, March 11, 2009 HW # 3 Due	<ul style="list-style-type: none"> - Coordinate Transformations - Dealing with the Drift of the integral of the rate gyro - Finding Landmarks with the different distance sensors. 	Lab #6
Monday, March 16, 2009	<ul style="list-style-type: none"> - Review Structures and Unions, pointers and function parameters - Review RCServo Motor. - Talk about robot gripper designs and what materials to use. 	Lab #7 Work with your final Contest Group
Wednesday, March 18, 2009	<ul style="list-style-type: none"> - Dead-Reckoning - Can the Compass help us? Can Landmarks? - Briefly discuss the Kalman Filter 	Lab #7 Work with your final Contest Group
Monday, March 23, 2009	Spring Break	Spring Break
Wednesday, March 25, 2009	Spring Break	Spring Break
Monday, March 30, 2009	<ul style="list-style-type: none"> - Introduce Vision Processing - The CMOS Camera - The BAYER format - Centroid calculation 	Lab 7
Wednesday, April 1, 2009 HW #4 Due	<ul style="list-style-type: none"> - RGB color space - HSV color space - Segmentation algorithm finding multiple objects. 	Lab 7
Monday, April 6, 2009	<ul style="list-style-type: none"> - Continue with Segmentation algorithm. - Using Landmarks to update robot's position - Color Camera DSP board interface and source code. 	Lab #8
Wednesday, April 8, 2009	<ul style="list-style-type: none"> - Finish Color Camera DSP interface. - Using camera to calculate distance to an object. 	Lab #8
Monday, April 13, 2009	<ul style="list-style-type: none"> - Color Camera Catch up if needed - Dead-Reckoning - Path Planning. Have robot move to X, Y location 	Lab #8
Wednesday, April 15, 2009	<ul style="list-style-type: none"> - Path Planning. Avoiding obstacles during an X,Y move. 	Lab #8
Monday, April 20, 2009	<ul style="list-style-type: none"> - More about Kalman filtering? Line intersection algorithm for LADAR data. 	Final Contest Checkpoint 1
Wednesday, April 22, 2009 HW #5 Due	<ul style="list-style-type: none"> - Building your own Robot - What batteries to use? - Voltage Regulators, DC to DC converters. - Motors, Motor Amplifiers 	Final Contest Checkpoint 1
Monday, April 27, 2009	<ul style="list-style-type: none"> - Building your own Robot. - What processor to use? Should you use something other than a DSP? ATMEL? Parallax? PC104? 	Final Contest

Wednesday, April 29, 2009	- Building your own Robot. - What sensors should you use?	Final Contest Checkpoint 2
Monday, May 4, 2009	No Lecture, Office Hours in Lab	Final Contest Checkpoint 2
Wednesday, May 6, 2009	No Lecture, Office Hours in Lab	Final Contest
Tuesday, May 12, 2009 7PM-10PM		Final Contest Presentations