



**Grading:** All students are encouraged to attend every class period. The lecture content will follow the laboratory assignments in an obvious manner, so failure to attend a lecture will be a severe handicap in the lab. The semester project should represent the entire content of the class and is representative of a final exam grade.

Check-off on all labs	30%
Homework	30%
Semester Project	40%

**Topics Covered:**

- C programming of a MSP430 Microcontroller
  - Using Code Composer Studio
  - GPIO
  - PWM
  - ADC
  - UART serial interface
  - SPI serial interface
- C programming of Texas Instruments DSP processors
  - Using Real-Time Operating System SYS/BIOS
    - Timers
    - Hardware interrupts
    - SPI serial interface
    - Software interrupts
    - Threads
    - Semaphores
  - PI Speed Control design and implementation
  - Wall following / Obstacle avoidance using planer LIDAR distance sensor
  - Blob search vision algorithm for color tracking
  - Dead reckoning of robot pose using robot's optical encoders and IMU sensor
  - Use of the Kalman filter to fuse dead reckoning pose with motion tracking pose
- C programming of Linux applications
  - Using shared memory to communicate between ARM processor running Linux and DSP processor core
  - Use of the Kalman filter to fuse
  - Implementation of the A\* path planning algorithm